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SUMMARY OF RECENT ABSTRACTS *

VII. HELMINTHIASIS †

TREMATODES

Schistosomes: General

The *WHO Chronicle* (p. 737) contains a series of papers on schistosomiasis, which sums up much modern information and opinion, particularly on schistosomiasis as a man-made disease, and on the Leyte control project. GAUD (p. 59) makes the point that human factors are important in schistosomiasis, which is pre-eminently a disease of occupation and habits—for instance in relation to agricultural practices and to bathing habits. Population density is important and should be related not to total area but to cultivated area; migration is also a point, and the disease has been imported by travelling labourers into areas previously free.

LARIVIÈRE *et al.* (p. 58) give an account of the distribution of schistosomiasis in 2 districts of Senegal, where foci of *S. haematobium* and *S. mansoni* are found.

Both forms of schistosomiasis are present in the Yemen, and DI EGIDIO (p. 631) found records indicating *S. mansoni* in 8·4–24·6% and *S. haematobium* in 1·4–3·1% in the years 1957 and 1955 respectively. Males were more commonly infected than females.

SMITH and GELFAND (p. 61) show that in Southern Rhodesia, African infants may be infected with *S. haematobium* at 1½ years of age, and with *S. mansoni* some years later. The proportion of infected children rises quickly with age, and the authors think that the low incidence in infancy reflects resistance derived from mothers who have themselves had the disease. In Swaziland *S. mansoni* has been found in up to 49% of children, and *S. haematobium* in up to 75%;

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1959, v. 56. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on helminthiasis in this series, see the August and September issues of the *Tropical Diseases Bulletin* each year since 1939.

PITCHFORD (p. 307) blames the use of rivers, dams and canals for bathing and washing purposes, and suggests that for prevention more suitable bathing, washing and latrine facilities should be provided. In South Africa (Transvaal) the incidence of *S. haematobium* is little affected by living conditions unless safe bathing is provided, being generally very high, but PITCHFORD (p. 60) shows that the incidence of *S. mansoni* is closely correlated with living conditions. Where the population is scattered or where latrines are provided the rates are not high. Where safe drinking and washing water are provided and snail-infested rivers are several miles away, *S. haematobium* infection falls to practically nil.

SENFT (p. 634) has devised a perfusion apparatus for keeping schistosomes alive *in vitro*.

HALAWANI and BADRAN (p. 632) refer to the value of rectal biopsy in the diagnosis of both *S. mansoni* and *S. haematobium* infections. ALVES (p. 740) notes the wide distribution of schistosome eggs in the various organs of 200 Africans who died in a Salisbury Hospital, Southern Rhodesia, and were examined after death. He draws attention to the fact that where initial infection is heavy, as in irrigation farming, the patients may suffer severe illness and disability, and to the growing importance of water to the developing African countries. It is important to make an accurate evaluation of the effect of schistosomiasis on health. GELFAND *et al.* (p. 1040) failed to find schistosome eggs in autopsy specimens from 30 hearts of infected persons in Southern Rhodesia, and conclude that the heart is an unusual site for eggs.

FARID *et al.* (p. 741) describe chronic pulmonary schistosomiasis in patients with either *S. mansoni* or *S. haematobium* infections in Egypt. Pulmonary hypertension was present in all, and was due to diffuse endarteritis obliterans.

ISHAK and ABDEL MALIK (p. 1154) report a case of schistosomiasis of the spleen with abscess formation and infarction.

PELLEGRINO (p. 316) uses an intradermal test for schistosomiasis, and describes his techniques. KAGAN and OLIVER-GONZÁLEZ (p. 547) used the haemagglutination test in experimental schistosomiasis. Washed sheep red cells were incubated with tannic acid and then exposed to antigens prepared from cercariae, adults or eggs of *S. mansoni*, eggs of *S. haematobium* or *S. douthitti*; antisera were prepared by injecting antigens into rabbits. Positive reactions were obtained but there were some cross-reactions. With sera from infected children and adults the egg antigens gave the highest titres, and if more potent antigens are developed the test may prove clinically valuable. SCHOFIELD (p. 738) used Fairley's *S. spindale* antigen for complement-fixation tests, which he found valuable in the diagnosis of recent infections, but much less so in infections more than 3 years old, in which false negative results were common. The test is therefore of limited value in determining the true incidence of schistosomiasis in endemic areas. Treatment does not necessarily convert a positive to a negative reaction.

In Kuwait, FORSYTH (p. 633) tried various drugs in the treatment of schistosomiasis, but found difficulty because many of the immigrant Arabs and Iranis were temperamentally and physically unsuited to sustained treatment and its toxic effects. For in-patients a 5-injection intensive course of tartar emetic was best; for out-patients anthiomaline. Intravenous sodium or potassium tartrate often causes unpleasant side effects, and the stability of the solutions has been questioned; SOMERS and WHITTET (p. 850) have been able to show in

mice that these solutions can be sterilized by autoclaving, steaming or filtration without increasing their toxicity. NAGATY *et al.* (p. 460) report some benefit from using oxyphenonium bromide to counteract the immediate toxic effect of tartar emetic.

In South Africa, PITCHFORD and HARRISON (p. 319) found antimony dimercaptosuccinate (TWSb) effective against *S. haematobium* but ineffective against *S. mansoni*.

COLLINS *et al.* (p. 68) and ASHLEY *et al.* (p. 181) report on the schistosomicidal and toxic effects of certain para-aminophenoxyalkanes (this group being common to all the active compounds) and related monoamines.

HUBENDICK (p. 310) and ABDEL MALEK (p. 311) discuss the factors relating to the habitats of freshwater snails; details should be sought in the original papers. MARILL (p. 311) observes that the variations in the chemical composition of the water of a well and reservoir in Algeria did not affect the frequency of *Bulinus*. In a considerable paper ABDEL MALEK (p. 312) discusses the distribution of the snail hosts of schistosomes in the Nile basin and the Sudan, in relation to climate and vegetation. The paper is illustrated with maps, and should be read in full. In Southern Rhodesia, ALVES (p. 313) investigated the chemical constituents of surface water in relation to the snail hosts of schistosomes; pollution plays an important part in making a habitat suitable for snails. DE MEILLON *et al.* (p. 314) in the Transvaal could not find evidence that the chemical composition of natural unpolluted waters had any influence in determining snail habitats; fast current and severe pollution with sewage and industrial wastes are inimical to the snails, and turbidity is a factor.

HAIRSTON *et al.* (p. 314) describe the various techniques used for sampling water or mud and estimating snail populations. MARILL (p. 315) describes a method for determining the relative density of snail species in a habitat, in which a modification of the palm-leaf snail trap is used.

JACKSON (p. 175) sums up the background information on schistosomiasis in Africa with particular reference to irrigation schemes. He makes proposals for control, which involve the use of pipes or cemented channels, and the proper construction of reservoirs and their intakes and outlets. Maintenance involves weeding, molluscicides and suppression of snails by ducks and geese. The importance of preventing contamination of water by proper siting and sanitation of residual areas is referred to. This paper should be read in full. In a pilot project in an area of perennial irrigation in Egypt, VAN DER SCHALIE (p. 319) observed that snails were not completely eliminated in spite of thorough treatment, and stresses the high cost of copper sulphate. With the construction of the Sennar dam and the irrigation systems associated with it in the 1920s, and the consequent great increase in the human population, and the snail population, the schistosomiasis infection rates rose rapidly to a high figure; EL-NAGAR (p. 62) describes the control measures adopted—copper sulphate, mechanical traps and chemical barriers, treatment. The initial cost of the operation was 7/- per head of the population, and maintenance is about 2/- per annum. The author is hopeful about eventual success. In part of the Northern Transvaal where economic development with better cultivation and extended irrigation favour the spread of schistosomiasis, BRINK *et al.* (p. 1155) attempted control by treatment with Nilodin or Miracil D, but with disappointing results. Snail control by copper sulphate cannot be carried out on an effective scale and educational campaigns are making very slow progress.

Schistosoma haematobium

In Iraq, urinary schistosomiasis is primarily a rural disease, and the incidence of infection varies inversely with housing density and levels of hygiene; ZAKARIA (p. 951) describes the ways in which the infection may be contracted, mainly from canals or marshes, but also from the use of infected water for domestic or ritual cleansing purposes.

VERVOORN and RATULANGIE (p. 630) in part of Ghana found *S. haematobium* infection in 61 of 830 patients examined, and noted that only one-quarter of the infected persons had clinical manifestations which could be ascribed to the disease. SANSARRICQ (p. 1248) describes a focus of *S. haematobium* infection in the Upper Volta region, noting that as well as pools, a slow river formed an important source of snails, and that the incidence was higher the nearer the villages were to the water from which the infection came.

WEBBE (p. 952) found urinary schistosomiasis in up to 51% of Africans in parts of the Tanga Province of Tanganyika. He gives a list of the various species of *Bulinus* found. DE MORAIS (p. 1152) reports on the heavy incidence of *S. haematobium* in Mozambique, where *S. mansoni* is much less common. In South Africa, AZAR *et al.* (p. 546) found rectal biopsy specimens positive for eggs of *S. haematobium* in 224 (85%) of a group of 263 African schoolboys, a few of whom did not have eggs in the urine; only 13 of the 224 yielded viable eggs. The eggs in the wall of the bowel must have come from adults located there, and their probable migratory passage from the liver is outlined.

DAVE and DHAGE (p. 309) describe a re-survey of the village in the Bombay area in which schistosomiasis has been found; they report that 81 persons were still affected, showing presumably haematuria, eggs in the urine, or both.

WATSON (p. 60) discusses the ecology and distribution of *Bulinus truncatus* in the Middle East, and comments extensively on the effect of human activities on the incidence of *S. haematobium* infection. ZAKARIA (p. 546) shows that *Bulinus truncatus* has been widespread in Iraq for 6,000 years, and it seems likely that *S. haematobium* has been there since historic times. GAUD (p. 312) discusses the biological rhythms of *Bulinus truncatus* and *Planorbarius metidjensis* in North Africa; the former is found more frequently in summer but the latter is common in spring and disappears almost completely in summer. Many factors are involved and discussed.

In comparison of *B. truncatus rohlfsi* and *B. globosus*, from 2 different parts of Ghana, MCCULLOUGH (p. 1040) found each susceptible to the strain of *S. haematobium* from its own area, but somewhat refractory (in doses of infection likely to occur in the field) to strains from the other locality. WEBBE and MSANGI (p. 170) observed the fluctuations of populations of species of *Bulinus* in parts of Tanganyika, and related them to climatic conditions. They observed that *B. nasutus* started to shed cercariae of mammalian type, 21 days after a pond which had been dry for 5 months was refilled, and suggest that these cercariae may have been produced by immature infections which had survived the aestivation of the snails.

BRYGOO (p. 307) discusses the snails of Madagascar, where most parts of the country have foci of schistosomiasis.

HERVE and PIGANIOL (p. 1153) carried out a detailed investigation of 100 patients with urinary schistosomiasis; details should be sought in the original abstract.

ALVES (p. 62) reports cure of *S. haematobium* infection in 80–90% of African children treated with a single course of 60 mgm. per kgm. of lucanthone hydrochloride, distributed over 3 days; he regards this as suitable for mass treatment. In Somalia, BARUFFA and MAFFI (p. 632) tried Nilodin for ambulant treatment of patients with urinary schistosomiasis, but found that it was not very effective, and it gave rise to toxic symptoms. A patient who had been treated for vesical schistosomiasis with some 15 injections of anthiomaline developed fever with intense pain at the site of the injections; LOURMET *et al.* (p. 742) administered sodium versenate, a well known chelating agent, with dramatic results; cortisone was also used. ALVES (p. 1249) writes favourably of antimony dimercaptosuccinate (TWSb) in *S. haematobium* infection; it may be given intravenously or intramuscularly, and might eventually prove to be a success in mass treatment.

FORSYTH (p. 317) describes residual signs and symptoms relating to the urinary tract and persisting even after cure of the *S. haematobium* infection.

In 2 villages in Nigeria, PURSER (p. 847) treated schoolchildren with stibophen and used copper sulphate to clear the neighbouring pools and swamps of snails. The pools and swamps later dried up, but when they refilled after the rains *Bulinus globusus* was still plentiful, and the children who had been treated still showed high rates of urinary schistosomiasis a year later. In Gambia, SMITHERS (p. 319) used sodium pentachlorophenate in rain pools containing *Bulinus senegalensis*; the snails disappeared within 4 weeks but were back in 10 weeks. Though complete control was not achieved, transmission was considerably reduced.

Schistosoma mansoni

NELSON (pp. 174, 175) investigated an area of the West Nile District of Uganda, where *S. haematobium* was not found, and discovered a probable incidence of *S. mansoni* of 31%, the highest rates being in children aged 5–15. A process of immunity "would appear to prevent superinfection". *S. mansoni* is most prevalent in the Nile Valley and along the shores of Lake Albert; there is no transmission over 5,000 feet, and snails cannot breed in streams favourable to the *Simulium* vectors of onchocerciasis, so that the two diseases are mutually exclusive. In one township the former antimalarial drainage measures had reduced the incidence of schistosomiasis, but reliance on insecticides for malaria control may reverse this trend. Schistosomiasis is related to the movement of large numbers of migrant labourers each year. The important snail hosts are named.

In part of Puerto Rico, MALDONADO and OLIVER-GONZÁLEZ (p. 176) report that the incidence of *S. mansoni* infection declined from 22 to 11% in the period 1953–55, though no definite control measures had been instituted. Most cases are found at ages between 10 and 20. In parts of north-east Brazil, *S. mansoni* infection may reach 81% in persons aged 10–19 years, but is rare in infants. PESSÔA and AMORIM (p. 320) observed the acute toxaemic stage in children, and note that adults suffer from the sequels of the disease. They use BHC as a molluscicide, and other substances, but they stress the importance of education.

CHEEVER and WELLER (p. 546) report on various nutrient factors for the cultivation of *S. mansoni in vitro*; details should be sought in the original. As part of a study of amino-acids required by *S. mansoni*, and which might lead

to the synthesis of effective drugs, TIMMS and BUEDING (p. 848) studied a proteolytic enzyme elaborated by this trematode. BRYGOO and RANDRIAMALALA (p. 1153) found an acid-alcohol-fast substance in the capsule of the egg of *S. mansoni* which is not present in *S. haematobium*; this may be useful in differential diagnosis.

LAGRANGE (p. 461) infected 23 mice, each with a single cercaria of *S. mansoni*; all the infections except 1 proved to be unisexual. DE MEILLON and PATERSON (p. 461) show that in mice infected with *S. mansoni* a low-protein diet hastens death and affects the worms themselves, which are small and tend to produce abnormal eggs, apparently because their reproductive system is affected. MALDONADO (p. 851) assessed the viability of eggs of *S. mansoni* in tissues of infected mice at various intervals after treatment; no live eggs could be found at 33 days.

ROWAN (p. 176) reports that there is a daily periodicity in the appearance of cercariae of *S. mansoni* in various types of water in Puerto Rico; they are scarce before 9 a.m. and after 4 p.m., and the danger of infection is therefore greatest between these hours.

HALAWANI *et al.* (p. 60) discuss the nomenclature of *Biomphalaria alexandrina*. PARAENSE and DESLANDES (p. 1250) describe the morphology of certain planorbid snails. In discussing the taxonomic position of the snail hosts of *S. mansoni* BARBOSA (p. 321) concludes that in spite of difficulties the American species should be retained in the genera *Tropicorbis* and *Australorbis*, and the African species in *Biomphalaria*.

HARRY and ALDRICH (p. 63) discuss the ecology of *Australorbis glabratus* in Puerto Rico; it is most common in slow-flowing streams in the alluvial areas. BARBOSA and OLIVIER (p. 64) comment on *A. glabratus* and *Tropicorbis centimetralis* in Pernambuco, Brazil, and in particular on the ability of *A. glabratus* to survive desiccation, and on the effects of this desiccation on larval schistosomes in the snails. MAGALHÃES NATO and DE ALMEIDA (p. 65) also discuss desiccation and the physiology of *A. glabratus*.

In an account of certain foci of infection with *S. mansoni* in Brazil BARBOSA and COELHO (p. 177 *bis*) state that a very low infection rate in *Tropicorbis centimetralis* can maintain the infection in man at a level equal to that achieved by a much higher infection rate in *A. glabratus*, that infection in *T. centimetralis* is markedly seasonal, and that in one area 30% of house rats were infected. *T. centimetralis* is not a good host, and reacts violently to infection, with extensive destruction of sporocysts, whereas *A. glabratus* is much more tolerant. In part of Brazil CORREA *et al.* (p. 1156) found 1 of 498 *Australorbis nigricans* infected with *S. mansoni*, for the first time in that area.

MARTINS (p. 310) discusses the non-human vertebrate hosts of *S. haematobium* (practically non-existent) and *S. mansoni* (21 species of mammals found infected in Africa and America). TORREALBA *et al.* (p. 462) exposed 12 different kinds of Venezuelan mammals to *S. mansoni*; several showed infection and lesions, and the peccary permitted full development and passed many eggs in its faeces; it may be an excellent potential reservoir—it is widely distributed and lives in herds along the muddy banks of rivers in the endemic areas. LARIVIÈRE and BUTTNER (p. 462) show that the Gambian pouched rat (*Cricetomys gambianus*) is highly susceptible to *S. mansoni*; it is common in zones of endemic schistosomiasis in West Africa. BARBOSA *et al.* (p. 1157) from Brazil

report natural infection with *S. mansoni* for the first time in *Cavea aperea aperea*; various other mammals were experimentally infected.

The histopathology of the cutaneous reactions of the domestic pigeon in experimental infection with *S. mansoni* cercariae was described by COUTINHO-ABATH and JAMPOLSKY (p. 69).

BERDONNEAU (p. 308) describes the onset of schistosomiasis (*S. mansoni*) in a group of people who bathed in a waterfall in Martinique. The disease in those with prolonged immersion was first thought to be typhoid fever, with severe toxaemia, and MONTESTRUC (p. 308) comments that this is not an uncommon diagnosis. Symptoms were less severe in those exposed for a shorter time.

In the West Nile province of Uganda NELSON (p. 318) observed that malaria is the commonest cause of enlargement of the spleen, but that *S. mansoni* is associated with an increase of 10–20% in the spleen rate in children under 10 years and with a decrease of 10% in older children and adults. No satisfactory explanation of this last finding is available, but it can be said that "Egyptian splenomegaly" due to *S. mansoni* is not found. Haemoglobin levels are low in part of the West Nile province of Uganda, where hookworm infection is common, but investigations by NELSON (p. 318) suggest that infection with *S. mansoni* is also one of the factors.

ISHAK *et al.* (p. 739) discuss the value of needle biopsy of liver and spleen in Egyptian schistosomiasis, showing that positive results were found frequently when urine and faeces were negative. HAMILTON *et al.* (p. 1251) report on the pathology of Egyptian splenomegaly, concluding that the portal hypertension and splenomegaly are the result of obstruction of the intrahepatic veins and the formation of fibrous septa and anastomoses between the portal and hepatic veins. Schistosome infection is the major aetiological factor in the liver disease in this condition, though dietary deficiency may render the liver more liable to damage. POLAK *et al.* (p. 1252) found that fibrosis of the portal fields was the outstanding and constant change, with proliferation of the Kupffer cells. The changes conformed to the clay-pipe-stem cirrhosis or to coarse periportal fibrosis. Liver function tests showed impairment. KLOETZEL and KLOETZEL (p. 65) investigated the hepatosplenic syndrome in *S. mansoni* infection in an area of Brazil where malaria is not endemic, but where the people are nomadic and much use is made of the few available sources of water. A period of 5–7 years is probably needed between infection and clinical signs of splenomegaly, and 10 years for the spleen to reach maximum size. The total incidence of splenomegaly was 7·5%. There may be a familial predisposition, but familial incidence may also reflect similarity of habits within families. In liver disease as a rule the blood pressure tends to be low, but in a series of Egyptian patients with cirrhosis due to schistosomiasis ATA and ABD EL RAZZAK (p. 173) found that 6·5% had hypertension, especially of renal type probably resulting from infection of the urinary tract. They discuss the implications of these findings. FERREIRA (p. 178) discusses endocrine disturbances in the hepatosplenic form of *S. mansoni* infection. Young patients in this stage show deficiency in gonadotrophins and androgens, and splenectomy is followed by improved structural and sexual growth. The degree of splenic hypertrophy determines the extent of endocrine disturbance, though malnutrition and the chronicity of the disease are also possible factors. BOGLIOLO (p. 66) discusses splenoportography in hepatosplenic schistosomiasis, and notes that similar

periportal appearances may occur in other fluke infections of the biliary ducts.

LADOSKY (p. 849) discusses the pancreas in hepatosplenic *S. mansoni* infection; it may become fibrous, but this is probably not the result of portal hypertension though this occurs in this disease.

WARREN and DEWITT (p. 635) produced portal hypertension in mice by infecting them with *S. mansoni*.

KENAWY and EL-MAWLA (p. 172) studied the bone marrow and blood of patients with *S. mansoni* infection, before and after splenectomy. The operation led to an improvement in the anaemic condition, and the authors suggest that the spleen may have released into the blood stream some inhibitory factor which caused retention of the cells within the bone marrow.

PELLEGRINO (p. 547) reviews the immunological skin tests used in the diagnosis of schistosomiasis. MINNING *et al.* (p. 632) show that metabolic products of *S. mansoni* and *F. hepatica* maintained in culture media, are antigenic and can be used in complement-fixation reactions; they seem to be genus-specific, but it is not yet known if they are species-specific. In Brazil PELLEGRINO *et al.* (pp. 1156, 1250) used an intradermal test with an antigen from cercariae or adult *S. mansoni*, and found it valuable where faeces were negative; the test was more sensitive in adults than in children. EVANS and STIREWALT (p. 848) found that the fraction of the serum of persons infected with *S. mansoni* which is responsible for cercarial agglutinating reactivity and for pericercarial envelope formation is contained in a single fraction in the gamma globulin. The circumoval precipitin test with the sera of infected persons has proved valuable in the diagnosis of *S. mansoni* infections when other methods of diagnosis have failed, and RODRIGUEZ-MOLINA *et al.* (p. 738) report positive tests in 93·4% of 46 infected persons investigated.

BRENER and CHIARI (p. 322) and BRENER (p. 322) discuss the effectiveness of Fouadin and Miracil D in *S. mansoni* infections of mice. BRENER and PELLEGRINO (p. 636) describe a new thioxanthone derivative useful in *S. mansoni* infections of mice. LÄMMLER (p. 744) describes compounds which promise value in the prophylaxis of *S. mansoni* infection of mice.

In Brazil the principal foci of *S. mansoni* infection are the densely populated areas near towns and the large country farms; BUTTNER (p. 64) comments on the difficulty of control, and suggests that the only solution is to carry out social improvements and raise the standard of living of the working people. BARBOSA *et al.* (p. 180) report investigations on the molluscicidal action of certain insoluble copper salts; copper carbonate was useful in mud. MAGALHÃES NETO *et al.* (p. 68) record the unusual finding that groups of 100 *T. centimetralis* were more easily killed by sodium pentachlorophenate and copper sulphate than individual snails, the volume and strength of the solutions being the same per snail in each test. In a trial of pentachlorophenate in Brazil PARAENSE and PEREIRA (p. 180) found that 4 treatments over a period of 4 months cleared one stream for 2 years and greatly reduced the snail populations of several others. Complete eradication was difficult, and single applications were inadequate. Repopulation of treated areas takes place in the wet season when aestivating or other snails are washed in; snails may take refuge from the molluscicide by burrowing into mud. CHAIA and PAULINI (p. 322) show that in concentrations of 2–8 p.p.m. for sodium pentachlorophenate and 20–80 p.p.m.

for copper sulphate these substances are quickly lethal to miracidia of *S. mansoni*, but that much larger doses are needed for eggs.

FERGUSON and his colleagues (pp. 460, 850) in part of Puerto Rico obtained partial control of schistosomiasis through treatment, sanitation and molluscicides, but they then introduced the large snail *Marisa cornuarietis* into the main stream, and into ponds, and this caused a marked reduction in *A. glabratus*, probably through strong biological competition. This seems to be a positive forward step in control, for all the children under 5 are now free from the infection.

Schistosoma japonicum

The National Schistosomiasis Research Committee of China (p. 1041) has issued an account of studies carried out since 1951 on *S. japonicum* infection.

SADUN *et al.* (p. 463) report studies on the route of migration of *S. japonicum* embryos after infection of white mice with cercariae, and on the serum proteins in this infection in rabbits and man.

KOMIYA and KOJIMA (p. 548) successfully crossed *O. nosophora* with *O. hupensis*. WAGNER and CHI (p. 1041) found that on crossing *O. nosophora*, *O. formosana*, *O. quadrasi* and *O. hupensis* the hybrid young were often fertile, which brings doubt on their specific status, though for practical purposes the names should stand.

ASAMOTO (p. 954) describes the pathology of the liver in *S. japonicum* infection, which may go on to cirrhosis of various kinds. Portal hypertension may develop, but in the early stages this can be treated by a surgical procedure which is described.

WANG *et al.* (p. 327) conducted experiments on immunity in mice and rabbits repeatedly infected with *S. japonicum*. The degree of immunity was inversely proportional to the interval between successive inoculations, and the partial immunity affected only quantitatively the development of schistosomes subsequently inoculated.

HSÜ and HSÜ (p. 324) show that in mice the prepatent period of *S. japonicum* infection is longer in Chinese and Formosan strains than in Japanese and Philippine strains.

Dwarfism may occur in *S. japonicum* infection; KUO and CHIANG (p. 181) think that the cause probably is depression of the activity of certain endocrine glands. Treatment with antimony may improve the condition. TSOU and YING (p. 324) show that intestinal cancer associated with *S. japonicum* infection developed earlier than cancer uncomplicated by schistosomiasis; chronic schistosomiasis is one of the promoting factors of cancer.

LIU *et al.* (p. 324) show that the cercaria membrane reaction was positive in 94·3% of sera from persons infected with *S. japonicum*; it is more valuable than skin tests; it was also occasionally (but rarely) positive in other conditions or in normal persons. OKABE and TANAKA (p. 1253) describe a new reaction in which condensed and dialysed urine of patients with chronic *S. japonicum* infection gave precipitation with serum of infected rabbits.

MAO *et al.* (p. 1158) have used tartar emetic by mouth, in courses lasting several days, for the treatment of *S. japonicum* infections, and report favourably on it. Details are given in the original abstract, where comment is made that this work, if confirmed, is of major importance. In rabbits infected with *S. japonicum* LE *et al.* (p. 745) found that the curative effect of potassium antimonyl tartrate was inversely related to the concentration (0·5%, 1% or

2%) of the solution used. CHU and TING (p. 636) describe the action of Sb-11, a pentavalent antimonial salt of stibonic acid, on *S. japonicum* infection of monkeys; it works reasonably well and its toxicity is low—it should be tried on patients who cannot take intensive tartar emetic.

In Leyte Province, Philippines, PESIGAN *et al.* (p. 325) use various measures to control snails, which include removal of vegetation, drainage, filling or flooding low-lying areas. Improvements in rice-growing methods reduce the snail population and improve yield. Pit latrines are not generally acceptable to the people, but where they are used they reduce the snail infection rates. Molluscicides cannot be used in some areas. An immersion test for screening chemicals for activity against *Oncomelania nosophora* is described by MOON *et al.* (p. 182). KOMIYA *et al.* (p. 326) show that pentachlorophenate and calcium arsenite are effective against *Oncomelania hupensis*. WALTON *et al.* (p. 852) observed marked resistance to dinitro-o-cyclohexylphenol in *Oncomelania nosophora* from an area in which it had been used for 6 years; no resistance was found to sodium pentachlorophenate after 7 years of use.

Clonorchis sinensis; Paragonimus westermani; Fasciola hepatica

SADUN *et al.* (p. 1254) prepared various antigens from adult *Clonorchis sinensis*, one of which, an acid-soluble fraction, gave positive immediate skin tests in persons infected with that trematode. There were many cross-reactions in patients infected with *P. westermani* and *S. japonicum*, but the homologous antigens produced the largest wheals. Complement-fixation tests with some antigens were also usually positive in clonorchiasis, but again there were false positive results in the other infections. WYKOFF (p. 328) observes that rabbits and guineapigs are susceptible to *Clonorchis sinensis*.

P. westermani infection was found by SHIMIZU (p. 745) in 0·23% of *Semisulcospira libertina* taken in part of Japan, especially in the middle and lower basins of one river. NAKASE (p. 637) found larvae of *Paragonimus westermani* in *Eriocheir japonicus* and *Potamon dehaani* in part of Japan.

HAMADA (p. 1159) reports histochemical studies on experimental paragonimiasis.

In part of the Kochi Prefecture of Japan YAMAGUCHI *et al.* (p. 182) found positive response to an intradermal test with *Paragonimus westermani* antigen in about one quarter of the people. Eggs were found in the sputum of 7·2% of a group with positive skin tests. BUCK *et al.* (p. 746) found that intradermal tests with an antigen from *P. westermani* were valuable in detecting paragonimiasis in patients with pulmonary tuberculosis. SADUN *et al.* (pp. 852, 853) found a purified acid-soluble protein fraction of *P. westermani* useful in an intradermal test, and an alkali-soluble fraction in a complement-fixation test. Some cross-reactions occur between paragonimiasis and clonorchiasis with comparable antigens for skin reactions from each parasite, but the tests are useful in epidemiological investigations.

In a description of the signs and symptoms of paragonimiasis, based on a study of 200 cases, CHANG *et al.* (p. 70) note that though the early and common symptoms are respiratory, there is often abdominal pain and diarrhoea, and the central nervous system is often affected. Subcutaneous nodules are also common. BUCK *et al.* (p. 183) describe paragonimiasis of the kidney, a rare condition.

BUCK *et al.* (p. 746), as a result of experience in Korea, report in a favourable sense on the value of chloroquine in paragonimiasis.

COUDERT and TRIOZON (p. 854) describe an outbreak of *F. hepatica* infection in France, where hypereosinophilia was found to be the best warning symptom, and the intradermal test was a simple early diagnostic method. Emetine remains the best drug.

CESTODES

ROSEN and KIEFER (p. 183) use solutions of glycerin, magnesium sulphate and saline, given at 130°F. by duodenal tube, for the treatment of tapeworm infection, with great success. SCHNEIDER (p. 747) used Dichlorophen for taeniasis (*T. solium* and *T. saginata*) in 92 patients, and regards it as one of the best available treatments. VON HARNACK (p. 1042) writes favourably on Cestodin (a complex preparation of tin) in the treatment of tapeworm infections, and CASTILLO LINDLEY (p. 1161) similarly on mepacrine.

MACÍAS and MAQUEO (p. 855) report 25 cases of cerebral cysticercosis from Mexico. QUATTROCCHI and LA ROSA (p. 956) note that the use of cortisone promptly checked the symptoms in a case of cerebral cysticercosis, and discuss treatment in general.

GRABOWSKA *et al.* (p. 736) draw attention to the 6·4% incidence of *Taenia saginata* in butchery workers in Poland, where an investigation of food establishments was made.

SCHMID (p. 184) discusses hydatid disease as seen in Switzerland in the period 1926–55. *Echinococcus alveolaris* occurs all over the country, but mostly near the German border; *E. cysticus* (the unilocular form) is less common, but is mostly near the French border. Both are commonest in housewives. LEIKINA *et al.* (p. 956) found *Echinococcus multilocularis* in a small number of rodents in forest areas of the Novosibirsk region, and report some human cases, especially in hunters and others in contact with natural foci. The unilocular parasite is found in cattle, sheep (especially) and pigs; dogs do not seem to be important.

LUBINSKY (p. 748) writes of the hydatid cysts found in goats and other animals in abattoirs in Pakistan. FOSTER (p. 748) gives an account of hydatid disease in New Zealand, where the incidence is very high, especially in the Maoris.

In giving an account of the host-parasite relationships in echinococcosis SCHWABE *et al.* (pp. 1257, 1258) discuss the permeability of the hydatid cyst wall, age resistance to secondary echinococcosis in white mice, and the relation of environmental oxygen tension to the metabolism of the scolices. Details should be sought in the originals.

GARABEDIAN *et al.* (p. 856) report on various immunological tests in hydatid disease; details should be sought in the original. NORMAN *et al.* (p. 856 *bis*) used a bentonite flocculation test in hydatid disease, which gave more positive results in proved cases than the complement-fixation test. A tannic acid haemagglutination test gave more positive results than the bentonite test in verified cases, but also, apparently, more false-positive results. ADDIS and MANDRAS (p. 957) write favourably of the haemagglutination reaction in hydatid disease.

HEYNEMAN and WELSH (p. 955) describe the *in vitro* action of antiserum to adult *Hymenolepis nana* against various phases of the worm—egg, cysticercoid and adult. Details should be sought in the original. GORDADZE and GIGITASHVILLI (p. 1257) report epileptiform fits in a number of children infected with *H. nana*, which may excite the cortex "either by the way of

reflexes or by the discharge of toxins"; they ceased after anthelmintic treatment. DONCKASTER and HABIBE (p. 330) found papain, hexylresorcinol and piperazine ineffective against *H. nana* in man, but puromycin and acranil gave promising results; nevertheless they think that no satisfactory treatment is yet available. DONOSO and DONCKASTER (p. 855) found dithiazanine unhelpful in this infection.

By radioactive methods NYBERG *et al.* (p. 71) have shown that carriers of *Diphyllobothrium latum* excrete much less vitamin B12 in the urine than normal persons, and anaemic carriers of these worms excrete even less.

BOTERA and GOMEZ (p. 549) describe a case of ocular sparganosis from Colombia, the first to be recorded from there. The species was not identified.

Charles Wilcocks

(To be continued)

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

EAST AFRICA HIGH COMMISSION. **Annual Report of the East African Institute of Malaria and Vector-Borne Diseases, July 1958–June 1959, with a Ten-Year Retrospect** [WILSON, D. Bagster, Director]. 29 pp., 1 map & 4 figs. 1960. Dar es Salaam: Govt. Printer. [Shs. 3/.]

The inclusion of a 10-year retrospect renders this year's report of the Director particularly interesting. The East African Malaria Unit was sanctioned in 1949 but did not come into effective operation until the beginning of 1951, when it was removed from the original site at Muheza to the hill station of Amani, where the range of buildings recently vacated by the agricultural research organization there was taken over. This move provided excellent laboratory facilities in cool and lovely surroundings, still, however, within easy reach of intense malaria and other vector-borne diseases.

The original staff included an entomologist and 2 field officers. A malarial engineer was added in 1952 and an administrative secretary in 1953. In 1954 there was a further expansion to include 2 additional scientific officers—a biologist and a chemist—and an assistant scientific officer, together with appropriate junior staff. At the same time the unit received its present title.

In that year also the Pare-Taveta investigation was launched, involving the recruitment of 2 scientific and 4 field officers. An association with the World Health Organization was also initiated with the assignment of 4 staff members, later reduced to 2. In 1955 the posts of Deputy Director and one additional field officer were added to the cadre of the Institute.

The activities of the Institute are reviewed under the headings of Training Coupled with Research, which has involved the instruction of some 320 persons of different grades from medical officers to mosquito headmen; The Consultative Function, in which the malaria engineer has played a prominent part; Malaria in Man, involving reconnaissances in the Somaliland Protectorate, in all the provinces of Uganda, in the Machakos, Nandi and Nyanza Districts of

Kenya, and in the southern highlands of Tanganyika, the preparation of a malaria atlas of East Africa, the assessment of the importance of malaria as a cause of ill-health, and the study of antimalarial drugs with particular reference to drug resistance; The Natural History of *Anopheles gambiae* and *funestus*, including an intensive study of the gonotrophic cycle and the development of methods of ascertaining age-groups of mosquitoes; The Effect of Insecticide Spraying of Houses on Malaria Transmission, together with the study of toxicity of insecticides to the spraymen; The Chemical Contribution, in which one of the WHO staff members was particularly active; and work on Other Insect Vectors and other studies, particularly in regard to schistosomes and their snail carriers.

In his summary of work done at the Institute in 1958–59, the Director notes that the Pare-Taveta Malaria Scheme has now been terminated, save for a continuing project of surveillance. It has been shown that malaria transmission can be reduced to a very low level, but not completely arrested, by 4 years' residual spraying of houses in an area of hyperendemic malaria. *Anopheles funestus* has apparently been eliminated, but *A. gambiae* remains in fair numbers, especially where cattle are present as an alternative source of food. The persistence of a small degree of transmission is attributed mainly to the independence of *A. gambiae* from man as a host and to the introduction of malaria parasites by travellers entering the sprayed area.

The disease was however reduced to so low a level that it was possible to make a very fair estimate of its effect on people living in such hyperendemic zones. Anthropometric and certain clinical observations showed little or no change, but there was a reduction in infant mortality and an increase in fertility rates. The serum protein pattern in infants changed to what is regarded as the normal, and there was a general rise in haemoglobin levels, most marked in the youngest age-groups.

Entomological investigations have included research on the dispersion and longevity of *A. gambiae* and further studies on age-grouping of mosquitoes. Comparative studies on the larvicidal value of BHC and DDT have indicated that the latter is somewhat more effective, but that BHC is the more economical in operation.

Studies on the ecology of schistosome-carrying snails have been continued in the Korogwe ponds, and improvements have been devised in laboratory methods of snail breeding.

Various urban authorities have been advised on the design and planning of storm water and antimalarial drainage works, and a study of the problems of snail and mosquito breeding in dams has been followed up by the formulation of plans for modifying dam construction on an experimental basis with a view to minimizing such breeding.

The training activities, which form such an important feature of the functions of the Institute, have been continued and a special study has been made of the *Simulium* vectors of onchocerciasis in the neighbourhood of Amani.

The retiring Director, Dr. Bagster Wilson, who, with Mrs. Bagster Wilson, has contributed so much to our knowledge of malaria as it affects the African population, is to be congratulated on the impressive results achieved at the Institute on which he has expended so much labour since its inception 10 years ago.

[For 1957–58 Report, see this *Bulletin*, 1959, v. 56, 588.] *G. Covell*

MAFFI, M. Su un nuovo simbolismo grafico per la rappresentazione della distribuzione geografica dei vettori, con particolare riguardo alle anofele in Africa Equatoriale. [**A New Graphic Symbolism for Showing the Geographical Distribution of Vectors, particularly the Anophelines of Equatorial Africa**] *Riv. di Malariologia.* 1959, Dec., v. 38, Nos. 4/6, 241–50, 2 maps. English summary.

ODDO, F. Anofelini del massiccio delle Madonie. [**Anophelines of the Madonie Chain, Western Sicily**] *Riv. di Malariologia.* 1959, Dec., v. 38, Nos. 4/6, 251–9. English summary.

SMITH, A. & WEITZ, B. **The Feeding Habits of *Anopheles gambiae*, with particular reference to Subsidiary Hosts.** *Ann. Trop. Med. & Parasit.* 1959, Dec., v. 53, No. 4, 414–15.

Previous work, in Tanganyika and Kenya [this *Bulletin,* 1957, v. 54, 917; 1959, v. 56, 917], showed that cattle were the principal host outdoors and man indoors for *Anopheles gambiae,* some cattle-fed mosquitoes resting by day in huts. In swamp villages of South Pare, Tanganyika, man and cattle are again the main hosts, rather less than 7% of meals being on sheep, goat, dog or fowl. Cattle were relatively more numerous and accessible than these subsidiary hosts, but multiple feeds (about 4% of 1,908 mosquito gut smears tested) were mainly of a subsidiary host with either man or ox, suggesting that although sheep, goat, dog and fowl were bitten the mosquitoes preferred to engorge on man or cattle. The circumstances of the catches and direct observations support this interpretation. *D. S. Bertram*

LIU, L. B., WONG, K. C., CHEN, K. K. & WU, S. M. [**One Year's Observations on the Development and Habits of *A. sinensis* and *C. fatigans* in Foochow**] *Acta Entomologica Sinica.* 1960, Feb., v. 10, No. 1, 86–95, 6 figs. [31 refs.] [In Chinese.] English summary.

The authors made monthly observations for a year under laboratory and field conditions on the development and habits of *Anopheles sinensis* and *Culex fatigans* in Foochow.

C. fatigans laid more eggs per batch than did *A. sinensis.* Both species laid eggs between dusk and dawn, the peak periods being 8–10 p.m. for *A. sinensis* and 2–5 a.m. for *C. fatigans.* Hatching was hardly influenced by temperature, but the rate of hatching was a little higher in *C. fatigans.* Most of the *A. sinensis* rested in cattle sheds during the day and the *C. fatigans* in human habitations. Peak catches of *A. sinensis* were in April–June and of *C. fatigans* in May–August; peak activities in dwellings at night were respectively at 7–8 p.m. and 4–6 a.m. Both species fed on human as well as animal blood, but *A. sinensis* preferred cattle blood and *C. fatigans* human blood. Neither species showed evidence of true hibernation.

Larvae of *A. sinensis* bred primarily in clean pools and rice fields and *C. fatigans* in sewage ditches, fire-buckets and air-raid shelters.

H. J. O'D. Burke-Gaffney

MAEGRAITH, B. **Some Pathological Processes in Malaria as exemplified in the Development of Hepatic Lesions in Acute Infections.** *Riv. di Parassit.* Rome. 1959, Dec., v. 20, No. 4, 317–26. [26 refs.]

The pathological processes in malaria, as is now well known, lead to liver dysfunction and in cases to centrilobular necrosis [this *Bulletin*, 1949, v. 46, 180; 1957, v. 54, 920]. It is thought that specific and non-specific factors play a part. The former effect is thought to involve some substance in the nature of a soluble toxin whereas non-specific sequelae may arise, as in other cases, through conditions such as anoxia, brought about by local and general circulatory disturbances. In this connexion the blood flow in the liver is discussed in some detail, but a similar state of affairs may be found in other organs. One result of circulatory disturbance may be interference with cellular metabolic processes and this can also occur in diseases other than malaria. Where liver function is disturbed bilirubin may accumulate in the plasma, albumin production may be interfered with and the organ may cease to function as a detoxifying agent. Changes in the appearance of liver cells or in the macro structure may or may not be recognizable. Because of obstruction to blood flow centrilobular necrosis is frequently encountered. In monkeys this has been shown to be dependent in part on a reflex pathway in the hypothalamus effecting nervous control of the hepatic vessels. In cases of poisoning by carbon tetrachloride the interruption of blood flow is brought about by mechanical means but this is not so in malaria, in which cellular metabolism is also involved and interference with oxidative phosphorylation has been observed as a result of damage to mitochondria of liver cells. Circulatory failure may also occur in malaria with production of a condition of shock. The presence of circulating agents with marked physiological activity as a cause of hepatic lesions has not been ruled out. *J. D. Fulton*

Fuhrmann, G. & Peltzer, F. Messung von Enzym-Aktivität bei einem Fall von cerebraler Malaria tropica. Vorläufige Mitteilung. [**Estimation of Enzyme Activity in a Case of Cerebral Malaria**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1959, Dec., v. 10, No. 4, 375–8.

In a patient with cerebral malaria the following liver function tests were carried out: estimations of serum glutamic pyruvic transaminase, serum glutamic oxalacetic transaminase, lactic acid dehydrogenase, aldolase, and pyruvic acid. In addition a number of serum lability tests and electrophoresis of the serum proteins were carried out.

The patient was a 52-year-old Hamburg civil servant, who had spent his leave in Dakar. He was admitted to hospital in a comatose condition on the fourth day of a feverish illness and, when the diagnosis was made, treatment consisted in intravenous administration of Resochin (chloroquine). The fever abated the following day. Also on this day abnormal values were found for all the liver function tests mentioned above, with the exception of the Takata Ara test. The other lability tests all gave abnormal results. The serum enzyme values returned to normal within 2 to 3 days after the fever had fallen, but the serum proteins still showed a high gamma globulin and a positive thymol turbidity test after 3 days. *H. Lehmann*

Edozien, J. C., Boyo, A. E. & Morley, D. C. **The Relationship of Serum Gamma-Globulin Concentration to Malaria and Sickling.** *J. Clin. Path.* 1960, Mar., v. 13, No. 2, 118–23. [24 refs.]

A group of 211 children was studied in Imesi, 100 miles from Ibadan, Nigeria. The mothers of 98 of these had received Daraprim (pyrimethamine) during

pregnancy, and their children were given 25 mgm. of the drug monthly from birth onwards. A control group of 113 mothers and their children received inert tablets. In each group, any attack of fever was treated by a single dose of chloroquine. At a later date, when the oldest child was aged 26 months, the sera of all the children were examined, and their Hb types determined. The actual incidence of malarial infection is to be given in a later paper, but the authors make it clear that their subjects were not free from malaria at all times.

No significant changes in serum protein fractions were found except in the case of the gamma globulin. Before the age of 12 months the gamma globulin values were normal, in the region of 1·2 to 1·3 gm./100 ml., and showed no divergence as between protected and unprotected children. But thereafter the gamma globulins rose in both groups, and for children aged 12 to 26 months the mean values were as follows:—

Unprotected children

58 AA children, 1·58 ± 0·32 gm./100 ml.
13 AS children, 1·79 ± 0·34 gm./100 ml.

Protected children

35 AA children, 1·35 ± 0·30 gm./100 ml.
12 AS children, 1·41 ± 0·28 gm./100 ml.

For all the unprotected children (of whatever Hb type) the levels were higher than for the unprotected children, and the difference was significant ($0{\cdot}02 > P > 0{\cdot}01$). Among the unprotected children the mean gamma globulin level was significantly higher in the AS than in the AA children ($0{\cdot}05 > P > 0{\cdot}02$). A similar trend was evident in the protected children, but the difference was much less.

Separate surveys showed that the mean gamma globulin levels in health varied with the socio-economic status of the subjects, the values (in gm./100 ml.) being: (a) for Europeans in Ibadan, 1·20, (b) for Nigerian professional people, 1·81, (c) for non-professional Nigerians, 2·05, (d) for adult Nigerian villagers, 3·17. However, the levels were normal in children suffering from kwashiorkor.

Numerous reports are quoted, agreeing with the authors' contentions (a) that nutrition is not an important factor in producing the hypergammaglobulinaemia of Africans [this *Bulletin*, 1956, v. 53, 230; 1957, v. 54, 1452] and (b) that higher values are shown by Negroes than by white subjects when malaria (and sometimes social status) can be virtually excluded as a factor [*ibid.*, 1957, v. 54, 991; 1958, v. 55, 225].

The authors feel that the available evidence makes it probable that the capacity to maintain a high gamma-globulin level in health is an inherited characteristic, selected for the protection it offers against malaria and possibly other endemic diseases. They have then to explain why this characteristic, present in all their infant subjects, is more marked in those who are sickle-cell-trait carriers. They note that, in respect of gamma-globulin levels, the possession of the sickling trait has an opposite effect to that produced by prophylactic pyrimethamine, and that therefore it does not act by preventing the establishment of malaria parasites in the red blood corpuscles. They suppose, on the contrary, that sickling may be associated with an altered or enhanced antibody response against the parasite. [The abstracter would accept that such an association may exist, but would expect it to be an indirect one, and not a direct genetic effect. The present data relate it almost inescapably to malarial

infection. If the subsequent analysis of the malaria situation, promised by the authors, were to reveal more attacks, or shorter attacks, or both, in the sicklers, this would argue that the latter would be more favourably placed than non-sicklers for the development of malarial immunity by accepted methods.]

Alan B. Raper

WALTERS, J. **Quiescent Malarial Parasites.** [Correspondence.] *Brit. Med. J.* 1960, Apr. 16, 1206–7.

The author refers to the report by SHUTE [this *Bulletin*, 1960, v. 57, 671] of *Plasmodium falciparum* infection in a Nigerian blood donor who had been in Britain for less than 6 months: it was then suggested that existing data would seem to indicate that *P. falciparum* infections die out in 6–12 months.

Dr. Walters now reports the finding of *P. falciparum* parasites in the blood of a Nigerian woman more than 1½ years after her arrival in England. She was seen in June 1958, when she was 5 months pregnant. Routine blood examination showed evidence of anaemia and of parasites subsequently identified as *P. falciparum*. There was some splenomegaly and a reticulocytosis of 8%, but no fever; pregnancy and lack of challenge had lowered but had not eliminated acquired resistance to the parasite. Specific treatment soon cleared the parasitaemia and the clinical manifestations. Pregnancy was normal, and a healthy child was born. No malaria parasites were found in the placenta.

An exhaustive examination of the patient's original blood film by Mr. Shute revealed some 100 parasites, all early trophozoites and identified by him and by Professor GARNHAM as *P. falciparum*.

The latest date upon which the patient could have been re-infected was just before her embarkation in Lagos in late November 1956, so that this considerable number of parasites was found in her blood after 19 months.

H. J. O'D. Burke-Gaffney

VARGAS, L. Prevencion y tratamiento del paludismo. [**Prevention and Treatment of Malaria**] Reprinted from *Prensa Med. Mexicana.* 1959, Jan., v. 23, No. 1, 1–10, 2 diagrams. [Numerous refs.]

This paper reviews, with reference to the literature, the use of antimalarial drugs in the various forms and stages of the disease in man.

The prominent feature of the paper is the presentation of tables and schematic diagrams which show (1) the relation of parasite stages to clinical features, (2) the cycle of parasite development in mosquito and man [a footnote to this diagram adds that there are considerable differences of opinion regarding the cycle in the various plasmodia], (3) the action of the different drugs on the various stages of the 3 main species of *Plasmodium*, (4) the different combinations of drugs used, with references to published work, (5) the combinations recommended, (6) the dosage of these drugs, (7) synonyms of the common antimalarials.

H. J. O'D. Burke-Gaffney

SCALES, W. T. H. **Corneal Changes during Therapy with an Antimalarial Drug, "Camoquin".** *Med. J. Australia.* 1960, Feb. 20, v. 1, No. 8, 294–5.

"This case serves to implicate yet another of the antimalarials ('Camoquin') in causing corneal changes. Although it is too early to be sure, it would appear that its effect is less intense, and that therapy can be continued as long

as the corneal condition is kept under review, possibly at a reduced dosage level."

ARCHIBALD, H. M. & ROSS, C. M. **A Preliminary Report on the Effect of Diamino-Diphenyl Sulphone on Malaria in Northern Nigeria.** *J. Trop. Med. & Hyg.* 1960, Feb., v. 63, No. 2, 25–7. [10 refs.]

It has long been known that some sulphonamides have useful antimalarial activity [this *Bulletin*, 1942, v. 39, 395; 1951, v. 48, 420], and this was recalled by the authors when they found that leprosy patients in Northern Nigeria, under treatment with oral diamino-diphenyl sulphone [DDS], commonly experienced a marked feeling of well-being within a few weeks of the initiation of treatment. This occurred too soon to be attributable to amelioration of their leprosy; the suppression of gonococcal and other bacterial infections did not seem to furnish an adequate explanation, but the reduction of chronic malarial infections would readily account for this improvement in general health [*ibid.*, 1956, v. 53, 1092; 1958, v. 55, 731].

A preliminary investigation to test this hypothesis was carried out at 4 leprosy treatment centres in Zaria province. This showed, in patients treated with DDS when compared with untreated controls:—

(i) elimination of *P. malariae* parasitaemia,
(ii) reduction of *P. falciparum* trophozoite rate to one-tenth that of the controls,
(iii) reduced parasite density in those still showing *P. falciparum* parasitaemia, relative to that of controls.

It was, however, noted that virtually unaltered gametocyte rates and spleen rates indicated that malarial suppression was incomplete.

On the basis of this favourable field survey, a formal assessment of the antimalarial activity of DDS relative to that of 2 chloroquine salts, the diphosphate (Resoquin) and the phosphate (Avlochlor) was made in selected groups of schoolchildren by random administration. Single doses of 200 mgm. of DDS and 300 mgm. of chloroquine base were given orally, after which the blood was examined for malarial parasites at 48-, 72- and 96-hour intervals. DDS appeared capable of clearing the blood of trophozoites of both *P. falciparum* and *P. malariae*, though at a slower rate than that achieved by chloroquine.

It is reported that the price of the standard 100 mgm. tablet of DDS is one-tenth that of the standard 150 mgm. base chloroquine tablet in West Africa. [In the event of a mass treatment campaign against malaria in West Africa, DDS would seem to merit serious consideration as an alternative to chloroquine.] *J. H. Walters*

HAINE, J. Contribution clinique à la détermination de l'efficacité de la pyriméthamine dans la prophylaxie et la thérapeutique du paludisme. [**Clinical Observations on the Efficacy of Pyrimethamine in the Prevention and Treatment of Malaria**] *Ann. Soc. Belge de Méd. Trop.* 1959, Oct. 31, v. 39, No. 5, 767–74. [11 refs.]

The author records observations made on 15 cases of malaria in Europeans undergoing weekly pyrimethamine prophylaxis in the province of Kasai, Belgian Congo, where *Plasmodium falciparum* is the predominant malaria parasite. Malaria attacks also occur from time to time in subjects protected

by other antimalarial drugs, such as quinine or chloroquine, but no such attack has been known to persist beyond 48 hours after the commencement of adequate therapy.

In those under pyrimethamine prophylaxis the course of the disease has been very different. The temperature has regularly reached 40°C. and has often exceeded this figure. In spite of adequate therapy, paroxysms have been repeated over a period of 4 to 5 days, albeit with decreasing intensity.

Of the 15 patients under observation 11 experienced a malarial attack less than one year after the commencement of chemoprophylaxis. These 11 subjects had all been in the Congo for less than 18 months; 5 of them had never previously taken any other antimalarial drug.

In 10 cases (2 adults, 8 children) pyrimethamine prophylaxis had been maintained for 6 to 10 months before the attack. Before beginning prophylaxis with pyrimethamine 10 subjects (2 adults, 8 children) had taken other antimalarials regularly for 6 months or less. During this period there was only one malaria attack among this group.

The above findings suggest that a non-immune subject under weekly pyrimethamine prophylaxis has at least as much chance of experiencing a malarial attack after the lapse of 3 to 10 months as one who has taken any one of the other recognized antimalarials; moreover, this attack is likely to be considerably more severe.

On the other hand 12 Europeans (7 adults and 5 children of over 5 years) affirmed that they had taken pyrimethamine as a prophylactic for periods up to 2 years without ever experiencing a malarial attack. Of these 11 had resided in the Congo for at least 3 years under the protection of other antimalarials before commencing pyrimethamine prophylaxis, so that they had presumably become at least partially immune as the result of long sojourn in the country.

Case reports are presented of 3 patients whose malarial attacks are thought to represent early manifestations of an acquired resistance to pyrimethamine.

Pyrimethamine has also been used for treatment of the clinical attack among the indigenous inhabitants, in a dosage of 300 mgm. for an adult over a period of 48 hours. In all cases the temperature subsided within 5 days, and in 50% of cases within 3 days, results little inferior to those achieved with other antimalarial drugs.

The author concludes that there are cogent reasons for advising against the prophylactic use of pyrimethamine in weekly doses, owing to the danger of thereby producing resistance on the part of the malaria parasite. He does not suggest that pyrimethamine has no place in malaria prophylaxis, but believes that its use should be restricted to its administration in therapeutic doses during the malaria season where this is a short one [see this *Bulletin*, 1957, v. 54, 8] or in regions where, after the use of effective control measures, malarial endemicity has fallen sufficiently to reduce the collective immunity of the population, thus favouring a recrudescence of malarial incidence.

G. Covell

YOUNG, M. D. **The Effect of Small Doses of Primaquine upon Malaria Infections.** *Indian J. Malariology*. 1959, June–Sept., v. 13, Nos. 2/3, 69–74, 2 figs.

The subjects of this study, 11 Negroes and 2 Caucasians, were neurosyphilitic patients admitted to hospital for malariatherapy. They were infected by the

bites of *Anopheles quadrimaculatus* or *A. freeborni*, 8 with *Plasmodium falciparum* and 5 with *P. vivax*. When gametocytaemia appeared, or in some cases of *P. falciparum* was expected to appear, mosquitoes were allowed to feed upon the patients daily. After several days primaquine treatment was begun, the drug being given in some cases weekly, in others twice weekly and in some daily. The drug was administered after the mosquito feeds.

With both types of malaria 30 mgm. of primaquine weekly, either in a single dose or in 2 doses and 5 or 3 mgm. in daily doses usually prevented the transmission of malaria. Gametocytes were present or appeared in waves during continued drug treatment, but were not able to complete the sporogonous cycle in the mosquito. 5 mgm. was given daily for 93 days continuously and 3 mgm. daily for 39, 14, 127, 58 and 146 days respectively without producing any apparent toxicity. *G. Covell*

COURTNEY, K. O., HODGKINSON, R., RAMSEY, R. & HAGGERTY, M. **A Combination of Amodiaquin and Primaquine (Camoprim) in the Prevention and Cure of Sporozoite-Induced Chesson Strain *vivax* Malaria.** *Amer. J. Trop. Med. & Hyg.* 1960, Mar., v. 9, No. 2, 149–54, 2 figs. [16 refs.]

The object of this experiment was to test the protective and radical curative effects of Camoprim, each tablet of which contains 150 mgm. amodiaquine base and 15 mgm. primaquine base, against sporozoite-induced Chesson strain *Plasmodium vivax* malaria.

The volunteers were 18 white inmates of the Florida State prison, none of whom gave a history of previous malaria. They were divided into three groups, the first of which received 2 tablets of Camoprim in a single dose, weekly, for 8 weeks before and for 10 weeks after they had been bitten by infected *Anopheles quadrimaculatus*. None of these subjects developed malaria. The second group received no prophylactic treatment but were treated with a single dose of 600 mgm. amodiaquine after the attack had developed, followed by weekly doses of 2 tablets of Camoprim for the ensuing 10 weeks. A third group were similarly treated with amodiaquine but Camoprim was thereafter given every 2 weeks instead of weekly. Radical cure was obtained in all cases, the observation period being 150 days. It was noted that amodiaquine alone removed gametocytes of *Plasmodium vivax* from the circulating blood within 36 hours, while it has been previously shown that primaquine has a pronounced action against the gametocytes of *P. falciparum* [this *Bulletin*, 1957, v. 54, 7].

The authors conclude that Camoprim may prove a useful drug in malaria eradication programmes, particularly under circumstances where the use of residual insecticides is for any reason impracticable or ineffective. *G. Covell*

COVELL, G. **The Influence of War on the Development of Malaria Control Measures.** *Riv. di Parassit.* Rome. 1959, Dec., v. 20, No. 4, 259–62.

This is a brief but interesting general account of the developments in malaria control before, during and after the second world war—achievements which are now generally known and appreciated. Unfortunately, it is true to state that in this respect war proved a great stimulus to progress.

[It is stated that GUTTMANN and EHRLICH discovered the therapeutic properties of methylene blue in malaria. The reviewer would like to point out that

MANSON used it in 1884 in Hong Kong in lieu of quinine in quartan malaria, on the basis that its curative value was proportional to its staining qualities. The note appears in his Diary, but was never published.]

Philip Manson-Bahr

RADACOVICI, Ecaterina *et al.* Contribuţii la studiul malariei în zona bazinului hidrografic al rîului Ialomiţa. [**Contributions to the Study of Malaria in the Hydrographic Area of the River Ialomita**] *Microbiol., Parazitol., Epidemiol.* Bucharest. 1959, May–June, v. 4, No. 3, 241–9, 1 folding fig.

The authors report on the results obtained between 1949 and 1958 in the eradication of malaria in the basin of the R. Ialomiţa in Rumania by means of residual insecticides and the treatment of cases. The geography of the area is described in detail, and is illustrated by a sketch map. In 1949 there were 10,188 cases of malaria in the 88 localities of the area among a total population of 185,236, giving an infection rate of 5·5%. In 1952 the number of cases had fallen to 914 (0·5%) and in 1953 to 2 cases. In the latter year no evidence of malaria infection could be obtained in the examinations of 2,091 children aged up to 14 years. 5 cases were recorded in 1955, none in 1956 and 1957, and 3 cases in 1958. *D. J. Bauer*

CABRERA PALMA, N. de J. Barreras de protección urbana en la erradicación del paludismo. [**Barrier Spraying in Towns in the Eradication of Malaria**] *CNEP Bol.* Mexico. 1959, Oct.–Dec., v. 3, No. 4, 8–26, 16 figs. [31 refs.] English summary.

This paper discusses the use of barrier spraying to economize in operations during a malaria eradication campaign. Since malaria is mainly a rural problem, its incidence normally declines in the centres of large towns, which seldom provide vector breeding sites. Therefore it is unnecessary to spray all the houses in many towns and cities; all inhabitants can generally be protected by spraying the peripheral dwellings. This barrier may be a complete ring; but sometimes part of the circumference is protected by natural barriers (such as the sea or high porous rocks) which do not provide breeding sites. Vigilance is necessary to verify the efficacy of spray barriers; evidence of failure will be the discovery of live vectors in the centre of "protected" towns or cases of malaria proved to be contracted in such areas. On the other hand, barriers may be reduced if careful checks show that this does not result in such failures.

J. R. Busvine

KACHROO, P. **Preliminary Laboratory Observations on the Role of Common Weedicides as Larvicides.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1959, Sept., v. 7, No. 5, 151–4.

Tests were made of the larvicidal action of some modern weed-killers on first and second instar larvae of "local anophelines" collected in the field. Most effective were Trioxone (containing 2,4,5-T-butyl), Telvar (80% diuron) and Agroxone (30% sodium 2,methyl,4,chlorophenoxy acetate) which gave nearly complete kills down to 0·0156% Next in effectiveness was Weedone (40% 2,4-D butyl ethanol ester). Least active were Fernoxone (80% 2,4-D-N_a), ACPM (also based on 2,4-D) and Atlacide (containing sodium chlorate).

Tests on the ovicidal action of these weed-killers gave erratic results.

J. R. Busvine

COLUZZI, A. Sensibilità al D.D.T. di alcune specie anofeliniche in Sardegna e in Italia continentale. [**Susceptibility to DDT of Some Anopheline Species in Sardinia and in Italy**] *Riv. di Malariologia*. 1959, Dec., v. 38, Nos. 4/6, 237–9. English summary (5 lines).

Previous tests of resistance by RAFFAELE and COLUZZI [this *Bulletin*, 1958, v. 55, 734], on 6 species of Italian anophelines, revealed no evidence of resistance due to insecticide treatments. Similar conclusions were reached by MARIANI *et al.* [*ibid.*, 1960, v. 57, 339] concerning *Anopheles labranchiae* in Sicily. These tests were done by the Busvine method; further trials in 1959 were made with the new WHO test. These involved *A. algeriensis, A. labranchiae atroparvus, A. maculipennis, A. labranchiae* and *A. sacharovi* in one or two places in Italy and *A. algeriensis* in Sardinia. Comparisons of results from heavily treated areas with results from those only recently sprayed showed no appreciable difference in LC50 values. The low value for *A. algeriensis* from Sardinia (where for 12 years DDT has been widely used) was significant. It was not possible to test *A. labranchiae* from Sardinia because of insufficient numbers; but this itself indicates the absence of resistance. *J. R. Busvine*

KUHLOW, F. **Normal Susceptibility Levels of *Anopheles pharoensis* Theobald to DDT and Dieldrin.** [Correspondence.] *Nature*. 1960, Apr. 30, v. 186, 410.

Anopheles pharoensis is a vector of malaria in several African countries, but nothing seems to have been published on its normal susceptibility level to DDT and dieldrin.

Tests were carried out on recently engorged wild females of this species at night in a village 10 km. outside the sprayed area of the Mass Malaria Control Campaign, Sokoto Province, Northern Nigeria. The next morning the mosquitoes were exposed for 1 hour to filter papers impregnated with either of the 2 insecticides by means of the WHO adult test method. During a recovery time of 24 hours the mosquitoes were kept in cups containing cotton wool soaked with sugar solution and the results were then read. The temperature and humidity during testing varied from 24°C. to 28·4°C. and 74% to 85% respectively: during recovery, the temperature varied from 20–30°C.

A table shows that with concentrations of DDT from 0·25% to 4%, the mortality rose from 2% to 100%: with dieldrin (concentrations 0·05% to 0·4%), the figures were 8% to 98%. In controls mortality was nil in the DDT group and 1% in the dieldrin group. The LC50, estimated graphically, was 1·5% for DDT and 0·14% for dieldrin. These figures lie within the range of 0·5% to 1·5% for DDT and 0·05% and 0·15% for dieldrin, which have been estimated for many species of anophelines from untreated areas. Thus *A. pharoensis* showed a normal susceptibility to these insecticides.

H. J. O'D. Burke-Gaffney

MOUCHET, J. & CAVALIE, P. Apparition, dans la zone de campagne antipaludique du Nord-Cameroun, d'une souche d'*Anopheles gambiae* résistante à la dieldrine. [**Resistance of *Anopheles gambiae* to Dieldrin in the North Cameroons Malaria Control Zone**] *Bull. Soc. Path. Exot.* 1959, Nov.–Dec., v. 52, No. 6, 736–41, 1 map. [10 refs.]

The north Cameroon antimalarial zone comprises a triangular area near the tip of the country remote from the coast. The population protected is between 300 to 400 thousand people, mainly centred round Maroua, Kaélé and Yagoua. From 1953 to 1956 inclusive, DDT was used for house-spraying, twice a year, at 2·9 gm./m². In 1957, experimental zones were arranged as follows: (1) Maroua: DDT twice a year; (2) Kaélé: dieldrin (0·6 gm./m.²) once a year; (3) Yagoua: BHC twice a year; (4) Boudva: untreated. The residue of the former treated area was sprayed with DDT once a year. This continued to 1959.

The effects on the vectors were as usual. *Anopheles funestus* rapidly became rare and vanished in many places; but *A. gambiae* persists. Susceptibility tests in 1957 by J. RATEAU showed normal susceptibility levels. Tests in 1959 by the Busvine method showed distinct dieldrin resistance in the Kaélé zone. According to the levels indicated by DAVIDSON [this *Bulletin*, 1957, v. 54, 124] there appeared to be about 13% homozygote susceptibles, 23% heterozygotes and 63% homozygote resistants.

Tests in the Moutouroua area, treated for 6 years with DDT, showed no resistance to that insecticide.

Dieldrin-resistant *A. gambiae* have now been found in Liberia, Upper Volta, Ivory Coast, Nigeria and the Cameroons [see *ibid.*, 1958, v. 55, 1077; 1959, v. 56, 419; 1956, v. 53, 857]. Kaélé, the site of the present resistance, is the farthest east. *J. R. Busvine*

RAFI, S. M. **A Preliminary Report on Resistance of Mosquitoes to Insecticides.** *Pakistan J. of Health.* 1960, Jan., v. 9, No. 4, 232–7.

DDT has been used systematically as a residual spray in certain districts of West Pakistan since 1952. One of these districts is Sheikhupura, where tests have recently been undertaken to find out whether resistance to this insecticide has developed in any of the local mosquito vectors. Specimens of *Anopheles annularis, A. culicifacies* and *A. pulcherrimus* from sprayed and unsprayed villages have been subjected to DDT concentrations of 0·25, 0·5, 1·0 and 2·0%. These preliminary tests gave no indication of resistance in any of the 3 species.

Spleen and parasite rates of children recorded in the two groups of villages since 1952 support the above findings. Both rates show a marked reduction in the sprayed as compared with the unsprayed villages. Mosquito collections carried out twice weekly have also been consistently lower in the sprayed than in the unsprayed villages. *G. Covell*

PAL RAJINDAR & BHALLA, S. **Multiple Resistance in** *Anopheles subpictus*. *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1959, Sept., v. 7, No. 5, 135–43. [10 refs.]

Resistance to the chlorinated residual insecticides may involve either DDT and its analogues or BHC and the cyclodiene compounds (dieldrin, etc.). Resistance to both groups has occurred in flies, bed bugs and lice, but this double resistance is rare in mosquitoes.

DDT resistance has been found in *Anopheles subpictus* in the Delhi area (SHARMA *et al.*, *Indian J. Malariology*, 1957, v. 11, 401). The present authors have found dieldrin-BHC resistance together with some DDT resistance in

a sprayed area near Calcutta. The results of Busvine tests on sugar-fed adult females were:—

Area	Spray history	LC50 (%) DDT	gamma BHC	dieldrin
Tollygunge (W. Bengal)	DDT & BHC	3·16	0·14	2·6 (4 hrs.)
Sibpur (W. Bengal)	unsprayed	1·0	0·08	1·26
Jawalaheri (Delhi)	DDT	3·0 (24 hrs.)	0·016	0·16
Arthala (U. Pradesh)	unsprayed	0·26	0·022	0·26

(Results for Jawalaheri and Arthala are from SHARMA *et al., loc. cit.*)

It will be seen that the values for Sibpur are rather higher than for Arthala; probably this is because the control zone was too near the sprayed area and was invaded by resistant mosquitoes. The DDT resistance at Tollygunge is not very high; probably because the area was only twice sprayed by DDT (in 1956), after which BHC was regularly used for mosquito control. *J. R. Busvine*

MARTÍNEZ PALACIOS, A. Las pruebas de susceptibilidad de los vectores de paludismo en México, durante 1958 y 1959. [**Tests of Susceptibility of Malaria Vectors in Mexico in 1958 and 1959**] *CNEP Bol.* Mexico. 1959, Oct.–Dec., v. 3, No. 4, 27–36, 1 map. English summary.

BARRERA, A., HECHT, O. & MANCERA, Ofelia. Estimacion cuantitativa de la excitacion producida por el contact con superficies tratadas con DDT, en tres especies de anofelinos mexicanos. [**Quantitative Estimation of the Irritation produced by Contact with Surfaces treated with DDT in Three Species of Mexican Anophelines**] *Riv. di Malariologia.* 1959, Dec., v. 38, Nos. 4/6, 213–36, 7 graphs. English summary.

It has long been known that DDT residues tend to irritate mosquitoes and make them fly off treated surfaces. This sensitivity to DDT varies in different species and even in different strains of the same species. It is important in practical mosquito control and especially in relation to the possible development of behaviouristic resistance. Recently, two or three methods of measuring it have been suggested [BROWN, this *Bulletin*, 1959, v. 56, 923; DE ZULUETA, *ibid.*, 1960, v. 57, 103; COLUZZI, *ibid.*, 1960, v. 57, 220]. This present paper suggests yet another method.

Groups of 20 female anophelines are used 2 days after emergence in laboratory colonies; they are fed on blood in some tests, unfed in others. They are confined in a transparent plastic cylinder (27 cm. long, 17 cm. diameter) the ends of which are closed with paper impregnated with 1% DDT in Risella oil (as supplied for the WHO Resistance Test). The mosquitoes do not like to rest on the smooth plastic cylinder and any of them which fly settle again on the treated paper ends. The mosquitoes are observed for 3 hours and the number of flights recorded for each of the last 20-minute periods in the 6 successive half hours. These figures give very clear indications of differences in irritability, which can be expressed in simple terms by the mean number of flights per 20-minute period. A closer examination of the data shows that the number

of flights gradually rises in most cases, though in one instance it is maximum at the first period and gradually falls.

The authors manipulate the figures in various ways. A correction for flights in control tests (no DDT in the paper) is made, on the lines of Abbott's formula. The cumulative totals of flights are plotted against logarithm of "dosages" (exposure multiplied by deposit in gm./m²). The various values are now calculated as percentages of the final total and then converted to probits (100% being taken as 7·88 probits, for some reason). From graphs of these values, the "dose" corresponding to 50% of the flights is estimated and called the "DI50". The actual numbers of flights that have taken place at this point are determined, divided by the total numbers of mosquitoes and again divided by the DI50 to give an index of irritation ("LI").

The mosquitoes tested gave the following results:—

		Average no. flights per 20 mins.	Irritation index "LI"	[Ratio]
A. albimanus	(unfed)	67·3	0·405	[101]
„	(blood fed)	16·6	0·062	[15]
A. aztecus	(unfed)	45·0	0·159	[40]
„	(blood fed)	35·2	0·131	[33]
A. quadrimaculatus	(unfed)	25·8	0·103	[26]
„	(blood fed)	1·2	0·004	[1]

It is clear that feeding greatly reduces activity, especially in some species. Whether the average number of flights or the irritation index is used, the order of activity is: *quadrimaculatus* (fed) < *albimanus* (fed) < *quadrimaculatus* (unfed) < *aztecus* (fed) < *aztecus* (unfed) < *albimanus* (unfed).

[It seems doubtful whether the elaboration of the data was justified. In particular, a probit transformation does not seem appropriate, especially as the 100% limit has been arbitrarily fixed at a 3-hour exposure. The use of "dose" is confusing, since the deposit was constant and it is not certain that contamination of the mosquitoes was a simple function of time. Expressing deposit in gm./m² is also undesirable, since it has no relation to wall deposits, as might be inferred. Finally, the elaborately derived irritation index seems to give values in about the same ratio as the simple means of numbers flying.]

J. R. Busvine

Rachou, R. G., Moura Lima, M. & Leal, J. M. Grau de suscetibilidade do *Anopheles* (*Nyssorhynchus*) *darlingi* ao DDT em duas localidades do Estado de Minas Gerais (Brasil). [**Susceptibility of *Anopheles darlingi* to DDT in Two Localities in the State of Minas Gerais, Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1959, Jan., v. 11, No. 1, 67–70.

The English summary appended to the paper is as follows:—

"In March-April, 1958, the susceptibility of *Anopheles darlingi* to DDT was tested in two localities of the State of Minas Gerais, Pedra Maria da Cruz and Fazenda Curral das Varas, both in the Município of Januária, in the São Francisco Valley. The Busvine & Nash Technique was followed. The mosquitoes exposed to the insecticide were caught with human bait. In both localities, *Anopheles darlingi* revealed high susceptibility: the L.C.50 in Pedra Maria da Cruz was 0·26% ±0·01 and in Fazenda Curral das Varas 0·37% ±0·03.

"The houses in both localities were sprayed with DDT at least three times when the tests were made."

GÓMEZ MENDOZA, I. La evaluación epidemiológica en la campaña de erradicación del paludismo en México. [**Epidemiological Evaluation in the Malaria Control Campaign in Mexico**] *CNEP Bol.* Mexico. 1959, Apr.–June, v. 3, No. 2, 11–18.

The procedures to be adopted to evaluate the progress of a malaria eradication campaign are described and the example of Mexico is given in some detail.

The first necessity is to carry out epidemiological studies throughout the course of the campaign so that any interference with the expected reduction of malaria cases can be quickly investigated and remedied. The data are obtained (a) from information about cases received from medical, hygiene, pharmaceutical, and educational personnel throughout the endemic area, and (b) from blood slides taken by the Malaria Service itself from (i) fever cases, (ii) cases of recent fever and (iii) non-febrile cases. In 1958, over 30,000 people from 7,000 localities supplied information, and obtained 118,233 blood films of which 1·7% were positive. Blood films obtained by the Malaria Service numbered 285,000, of which 0·4% were positive. *Plasmodium vivax* was the dominant species present, *P. falciparum* was less common, and *P. malariae* least, in the proportions of 87:12:1.

The positive cases were then investigated and information was forthcoming from 1,783 of the total 3,290; particular attention was paid to the date when infection was acquired and the locality. Analysis showed that 582 cases arose in the treated areas in 1958. Finally, exhaustive investigations were carried out to discover the origin of these "break-throughs".

[See also this *Bulletin*, 1959, v. 56, 416; 1960, v. 57, 451.]

P. C. C. Garnham

BOUISSET, L. & RUFFIE, J. L'adaptation biologique du parasite à l'hôte. [**Biological Adaptation of Parasite to Host**] *Méd. Afrique Noire.* Dakar. 1960, Mar. 1–15, v. 7, No. 5, 89–92, 3 charts, 1 diagram & 3 figs. [16 refs.]

The host-parasite relationship is one of the chief features of parasitism in all forms and the *milieu* provided by the host is all-important, each species being adapted to a certain type which is generally of stable character. Equilibrium between host and parasite is upset when the conditions within the host are disturbed and either may reap advantage. The authors have investigated the consequences of alteration in host temperature and also in its nutritional state. Malaria therapy in certain forms of syphilis provides a practical demonstration of the effects of altered host temperature. Lowering of the host's temperature may also affect parasitism considerably, as BRUMPT showed in the hibernating dormouse during infection with trypanosomes.

The authors have studied the effect of lowering the temperature of white rats by treatment with Largactil [chlorpromazine], Dolosal and Phenergan [promethazine] so that the internal temperature of the rat was reduced to 30°C. when infected with *Trypanosoma equiperdum*. 25 animals of weight 200–260 gm. were used; 10 of them served as controls. The survival time was longer in the case of the rats with lowered temperature, presumably because of the slower multiplication of trypanosomes which is shown in tables. The authors believe that this finding might have a clinical application. Development of *Plasmodium*

berghei was then studied in rats deprived of vitamin A. The results were apparently the same as those described previously by the authors [this *Bulletin*, 1959, v. 56, 16].

[It was noted in comment on the previous paper that the earlier work of FABIANI and GRELLET (*ibid.*, 1953, v. 50, 12) on the subject of vitamin A had not been mentioned and the results differed from those of the present authors.]

J. D. Fulton

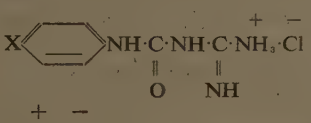
TERZIAN, L. A. & STAHLER, N. **Some Inorganic Acids, Bases and Salts as Determinants of Innate Immunity in the Mosquito.** *J. Infect. Dis.* 1960, Jan.–Feb., v. 106, No. 1, 45–52, 6 figs.

The susceptibility of *Aëdes aegypti* to infection with *Plasmodium gallinaceum* was measured by oöcyst counts per stomach in mosquitoes fed on 4% sugar solution plus the substance under test for about 84 hours before and 72 hours after the infecting meal. Controls were run in parallel, being infected from the same chicken, and otherwise fed only on sugar solution.

Bases (sodium hydroxide and potassium hydroxide) and acids (hydrochloric, phosphoric and citric) at concentrations of 0·1 to 0·2 M increased susceptibility to infection. Resistance to infection followed administration of sodium, potassium, calcium chlorides, sodium citrate and the sodium or potassium hydrogen phosphate salts. With magnesium chloride and sodium and potassium phosphates only, resistance occurred at low concentrations but changed at higher concentrations to greater susceptibility than in controls. Additive effects were not obtained. This result and experiments combining the antibiotic, oxytetracycline (which depresses infectivity), and sodium or potassium dihydrogen phosphate suggested that some metabolic site, crucial in determining susceptibility, is fully combined first with one compound, and interaction with a second substance does not occur to influence infectivity further. The inhibitory effect of oxytetracycline on parasite development was, however, not affected by the salts. [See also this *Bulletin*, 1956, v. 53, 1222; TERZIAN, *J. Cell. & Comp. Physiol.*, 1955, v. 46, 279.] *D. S. Bertram*

CHIN, Y. C., WU, Y. Y., SKOWRONSKA-SERAFIN, B., URBANSKI, T. & VENULET, J. **Antimalarial Properties of some Guanidine Derivatives.** [Correspondence.] *Nature*. 1960, Apr. 9, v. 186, 170–71.

A number of aryl-amidine-urea derivatives represented by the general formula



where X may be NO_2 or $NH_3 \cdot Cl$ or other substituent group, were investigated for activity against *Plasmodium gallinaceum* in groups of 5 chickens, which weighed 40–55 gm. A few hours after inoculation with 25 million parasites intravenously, the test materials were given *per os*, followed by twice daily dosage for 3 days at the level of one-tenth the LD50 dose. On the day after the last dose blood smears were examined. In the case where $X = NO_2$ in the above formula the compound had one-quarter the activity of Paludrine [proguanil] weight for weight and was very much less toxic than that substance.

The corresponding amino derivative was less active and more toxic for mice. No marked untoward symptoms were produced during chronic toxicity tests in rats. *J. D. Fulton*

See also p. 797, GOODWIN & RICHARDS, **Pharmacologically Active Peptides in the Blood and Urine of Animals infected with *Babesia rodhaini* and other Pathogenic Organisms.**

BLACKWATER FEVER

SERGENT, Ed. & PARROT, L. Disparition de la fièvre bilieuse hémoglobinurique en Algérie. [**Disappearance of Blackwater Fever in Algeria**] *Bull. Soc. Path. Exot.* 1959, Jan.–Feb., v. 52, No. 1, 42–7, 1 map. [Also in *Arch. Inst. Pasteur d'Algérie.* 1959, June, v. 37, No. 2, 256–62.]

No cases have been recorded since 1928.

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:— epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

ERRATUM

In the paper by DUGGAN, A. J., this *Bulletin*, 1960, v. 57, pp. 344–345, the word " cause " on line 2 of p. 345 should read " course ".

WEINMAN, D. **Trehalose Metabolism of Trypanosomes.** [Correspondence.] *Nature.* 1960, Apr. 9, v. 186, 166.

The author, during earlier studies on the cultivation of African trypanosomes [this *Bulletin*, 1958, v. 55, 377] has reported that addition of trehalose [a disaccharide which readily yields 2 molecules of glucose] plays a part in rendering cultures of *Trypanosoma rhodesiense* infective for the mammalian host. This sugar is also present in the natural vector [*ibid.*, 1960, v. 57, 107] and the author now states that cultures of *T. gambiense* and *T. rhodesiense* " are activated " by this sugar but that it is not the only factor involved in infectivity. Other factor or factors may be concerned with the utilization of this substance. It appears that only recently isolated strains are influenced by trehalose and one maintained for 104 days at −70°C. has been " activated " in this way.
J. D. Fulton

OSAKI, H. **Studies on the Immunological Variation in *Trypanosoma gambiense* (Serotypes and the Mode of Relapse).** *Biken's J.* Osaka. 1959, Nov., v. 2, No. 3, 113–27, 6 figs. [25 refs.]

Using *in vitro* agglomeration and the resistance of cured mice to reinfection by the homologous antigenic variant as indicators of antigenic identity, the author of this paper has identified 24 antigenic types in a laboratory strain of

Trypanosoma gambiense maintained in white mice. Antigenic variation occurred at relapse after subtherapeutic treatment of the infected mice with human plasma (whole or frozen-dried), Stibnal (antimony sodium tartrate), or acriflavine, or after treatment with homologous immune plasma or maintenance of infected mice at 45–50°C. for 25–60 minutes: such variation also apparently arose spontaneously. 3 of the antigenic variants appeared with special frequency: also variants often reverted after further relapses to the antigenic type of the parent strain. Agglutinating antibody was detectable for 1–2 months after treatment and the resistance of cured mice to reinfection with the homologous variant apparently persisted for at least 521 days. Some work was undertaken with clones, but it is unfortunately not clear from the author's results whether these clones did in fact change their antigenic nature after relapse or not. Some development of resistance to the therapeutic agents was noted after their repeated use. [The experimental details given in this paper are very sparse.]

[See also this *Bulletin*, 1957, v. 54, 656; 1958, v. 55, 486.] *J. R. Baker*

McDonald, W. A. **Nocturnal Detection of Tsetse Flies in Nigeria with Ultra-Violet Light.** [Correspondence.] *Nature*. 1960, Mar. 19, v. 185, 867–8.

This work was done in Nigeria to study the night resting habits of tsetse with a view to selective spraying with contact insecticides. Blue, yellow, white and orange luminescent non-toxic pigments mixed with gum arabic glue were used to mark the thorax of tsetse (*Glossina palpalis* and *G. submorsitans*) with different spots indicating sex, hunger stage and so on. The flies were best caught in the afternoon, marked, and kept caged until released at dusk. They then could be detected when they had alighted, mostly well within 125 ft., in an ultra-violet beam from a portable and fairly compact battery-powered unit. Release earlier in the day allowed fly dispersal beyond convenient limits. Flies can be detected at 30 ft. Both sexes of *G. palpalis* rested by night only on leaves or twigs about 12 inches above ground. Similar surfaces and also creeper were used by *G. submorsitans* but from 1 to 15 ft., and the majority above 7 ft., above ground.

The ultra-violet equipment is briefly described and particulars of the suppliers of it and of the pigments are given. [The abstracter wrote to the suppliers of the luminescent pigments named in the above communication (Barber Electrical Services Ltd.) but found that they did not, in fact, manufacture these and were unable to provide a supply. It is thought, however, that they acted as a special courtesy as an intermediary in supplying the West African workers with powders prepared by the Research Laboratories of The General Electric Company Ltd., Wembley, Middlesex, England, or possibly Derby Luminescents Ltd., 11–12 St. Swithin's Lane, London, E.C.4.]

[See also this *Bulletin*, 1958, v. 55, 987.] *D. S. Bertram*

Bursell, E. **The Water Balance of Tsetse Flies.** *Trans. Roy. Entom. Soc. of London*. 1959, Oct. 27, v. 111, Pt. 9, 205–35, 5 figs. [32 refs.]

Water Balance in Flies at rest

" 1. A method is described for estimating the water loss of resting tsetse flies. Corrections for size were made on the basis of residual dry weight, both

fresh weight and thoracic surface having been found to be unsatisfactory measures of size.

" 2. The powers of resistance to desiccation of different species were determined by consideration of their resting loss in relation to the quantity of expendable water reserves.

" 3. For the species studied there was no correlation between resistance to desiccation and habitat. It is tentatively concluded that the water balance of the adult tsetse has been no obstacle to the invasion of semi-arid and arid habitats.

Water Balance in Flies in the field

" 1. Releases were made of newly emerged *G. morsitans* and *G. swynnertoni* in the natural habitat of *G. swynnertoni*.

" 2. The recaptured flies were analysed in respect of water, fat and residual dry weight, and by comparison with a control sample killed within an hour of emergence the rate of water loss and of fat consumption was determined for successive days of teneral life.

" 3. The rates of water loss occurring in the field were compared with estimates of the resting loss determined in the laboratory under the same conditions of mean temperature and humidity.

" 4. Except for a single batch of recaptures the flies recovered from the field had lost water at rates lower than those shown by resting flies in the laboratory, in spite of the fact that the rate of fat consumption of the released flies showed that they had been active for some of the time before recapture.

" 5. It is suggested that the anomaly may be accounted for on the assumption that flies make use of microclimates of high relative humidity, and this possibility is considered in the light of field observations."

WILLIAMS, P. **The Effect of Atmospheric Pressure on** *Aëdes aegypti* **exposed to** *Dirofilaria immitis* **and on** *Glossina morsitans* **exposed to** *Trypanosoma rhodesiense* **or** *T. congolense*. *Ann. Trop. Med. & Parasit.* 1959, Dec., v. 53, No. 4, 451–64, 6 figs. [13 refs.]

A simple apparatus is described and figured, in which *Aëdes aegypti* infected with *Dirofilaria immitis* and *Glossina morsitans* infected with *Trypanosoma rhodesiense* or *T. congolense* were kept in incubators at mean temperatures of 80·9°F. to 81·3°F., at atmospheric pressures of 28·55 inches and 15·72 inches of mercury. These pressures corresponded to those at altitudes of, respectively, 1,300 feet and 18,500 feet above sea level. Relative humidity in the chambers was about 100%. Control series of infected insects were kept under identical conditions, except that atmospheric pressure was at 29·97 inches.

Substantial numbers of mosquitoes were used, and 2 dogs as donors of *D. immitis*—one with a low count of 1,620 microfilariae, the other with 8,300 microfilariae per ml. of peripheral blood. The reduced pressures studied had no effect on the curve of daily mosquito survival rates, percentage infection rates, numbers per mosquito and rate of development for filaria larvae. A slightly better survival of the populations at reduced pressure was not statistically significant; it may be real, however, and due to more favourable air-moisture conditions at the lower pressures.

Regarding tsetse, metacyclic forms of *T. rhodesiense* in glands and gut, and proventricular forms of *T. congolense* in single flies, were obtained at the lowest

pressure of 15·72 inches, and these out of only 6 and 4 infected flies, respectively, available. In a larger series of flies infected with *T. rhodesiense* at a pressure of 28·55 inches, gut but not gland infections occurred. Survival of tsetse was not notably affected by pressures.

It is concluded that atmospheric pressure at high altitudes is not a limiting factor to the survival of these insects, nor to the normal development of their filarial and trypanosome infections. Change in temperature (and humidity) with altitude is known or accepted, as this paper notes, as being important, although not always separable from concurrent pressure changes. [It is valuable to have this experimental demonstration that pressure effects are unimportant.]

D. S. Bertram

SAUNDERS, D. S. **The "White-Clubbed" Form of** *Syntomosphyrum* **(Hym., Eulophidae) parasitic on Tsetse Flies.** *Bull. Entom. Res.* 1960, Apr., v. 51, Pt. 1, 17–20.

KERRICH, G. J. **The Forms of** *Syntomosphyrum* **(Hym., Eulophidae) parasitic on Tsetse Flies.** *Bull. Entom. Res.* 1960, Apr., v. 51, Pt. 1, 21–3.

SAUNDERS, D. S. **On the Stages in the Development of** *Syntomosphyrum albiclavus* **Kerrich (Hym., Eulophidae) a Parasite of Tsetse Flies.** *Bull. Entom. Res.* 1960, Apr., v. 51, Pt. 1, 25–31, 3 text figs. & 4 figs. on pl. [16 refs.]

DE JONGH, R. T. & FRIEDHEIM, E. A. H. Le pentylthiarsaphénylmélamine (Mel W) dans le traitement de trypanosomiase à *T. gambiense*. [**Pentylthiarsaphenylmelamine [Mel W] in the Treatment of** *Trypanosoma gambiense* **Infections**] *Bull. Soc. Path. Exot.* 1959, Nov.–Dec., v. 52, No. 6, 769–76, 3 figs. on pl.

Mel W has been reported on for the treatment of *Trypanosoma gambiense* infections in only 8 cases so far recorded [this *Bulletin*, 1959, v. 56, 1115]. In these it proved to be well tolerated, and quite as effective as Mel B. 11 other patients with *T. gambiense* sleeping sickness, the subject of this report, have now similarly been treated at the Firestone Hospital in Liberia. From 10 of the patients parasites were recovered; the other patient had characteristic signs and cerebrospinal fluid [CSF] changes, but no parasites were recovered from him. 9 of the 11 patients had increased CSF cell counts and albumin content; 4 yielded parasites from the CSF; from 10 positive gland smears were obtained; only one (a child aged 2) had parasites in the blood, and they were present there in great numbers. The essential details of the findings in each case are set out in a table.

A 5% aqueous solution of Mel W was given intramuscularly in isotonic saline or glucose for two series each of 4 daily injections, with an interval of 2 weeks. The individual doses for patients weighing 33 to 51 kgm. were 200 mgm. Mel W (3·9 to 6·1 mgm. per kgm. body weight); the 2 children (aged 2 and 4 years) were given the drug at a dosage of 5 mgm. increasing to 50 mgm. (0·8 to 7·9 mgm. per kgm.), and 100 mgm. daily, respectively. All patients were given an initial half dose of the drug in each series of injections, to test sensitivity to the drug.

The blood of the 2-year-old child contained 10,758 trypanosomes per cmm. before the first injection of 5 mgm. (0·8 mgm./kgm.) of Mel W; it was re-examined frequently and the parasites had vanished from it within 5½ hours of the injection. On gland puncture of this child, which initially yielded parasites, no parasites were recovered 10½ hours after this injection. Full details are given of this child who had a particularly severe form of the disease with gross manifestations and a very heavy parasitic infection; within 5 months he was restored to apparent normality. Blood and gland examinations of the other 10 patients of this series, repeated over 3 weeks at weekly intervals after treatment, failed to yield parasites. The CSF of 4 patients initially parasite positive was free from parasites 9 to 28 days after the start of treatment; the CSF cell counts initially high in 9 patients were reduced to normal within 10 months at most and within a month or two in several cases; the CSF albumin content in these fell similarly though less rapidly. Clinical symptoms and signs correspondingly cleared within a month or two.

No toxic side effects, local or general, resulted from the use of Mel W in 10 of the patients; but the infant aged 2 developed a morbilliform eruption with desquamation, and fever, for a couple of days shortly after the completion of treatment. This child was gravely ill and cachectic, and he had had more intense drug treatment (30·7 mgm./kgm. as against 15 to 23 mgm./kgm. within 6 days) than the others. The authors conclude that Mel W in this series of patients proved to be an active and well tolerated trypanocide for all stages of sleeping sickness.

In discussion JONCHÈRE, while commending the great value of the melaminyl series of trivalent arsenicals in the treatment of trypanosomiasis, emphasized the potential dangers of toxicity of such potent compounds; he advocated their restriction to use in hospitals under skilled supervision. *A. R. D. Adams*

KAMOHARA, M. **[Antagonistic Actions on Trypanosomes of Human Serum from Patients with Several Diseases]** *Endemic Dis. Bull. Nagasaki Univ.* 1959, Dec. 23, v. 1, No. 4, 376–97. [56 refs.] [In Japanese.] English summary.

Observations were made on the agglomerating [=agglutinating] action of human serum, from normal people and people suffering from various diseases, on *Trypanosoma lewisi* and *T. gambiense*. Normal serum agglomerated *T. lewisi* in 53% of samples at a titre of 1 in 8 and *T. gambiense* in 100% at a titre of up to 1 in 64; in sera from pregnant women (middle period) the incidence was 81% with *T. lewisi* and 65% with *T. gambiense*. In pulmonary tuberculosis, syphilis, liver diseases (except cancer) the reaction was positive in 63%, 59% and 71% respectively for *T. lewisi*, while syphilitic sera agglomerated in 87% of samples.

Mice were inoculated intraperitoneally with 0·5 cc. human sera of various types and were infected with *T. gambiense* 24 hours later. Uninoculated controls all died after 6 days, but only 26% of mice treated with normal serum died, and with serum from pregnant women the mortality was 10%, 12% with tuberculous sera, 40% with sera from patients with cancer, and none with sera from patients suffering from liver diseases associated with jaundice (not due to cancer or cirrhosis in which the protective power of the serum was much diminished). *P. C. C. Garnham*.

ORMEROD, W. E. **A Study of Cytoplasmic Inclusions in *Trypanosoma lewisi* and their Relationship to the Formation of Antibody.** *J. General Microbiol.* 1959, Oct., v. 21, No. 2, 287–94, 1 fig. & 1 pl.

As shown in a previous paper [this *Bulletin*, 1959, v. 56, 519], during the reproductive period of *Trypanosoma lewisi* multiple cytoplasmic inclusions appear in the posterior end of the parasites, but after the crisis, when multiplication of the trypanosomes is inhibited by antibody [ablastin], the remaining adult forms contain only a single inclusion. In this paper the author describes an experimental study on the relationship of the multiple inclusions to the formation of the reproduction-inhibiting antibody. In one experiment rats, in which the infection had run for 5–6 days, received serum taken from infected rats after crisis, and the effect of the serum on the inclusions was studied. In another experiment the inclusions were examined after the crisis in the rats had been inhibited by splenectomy or treatment with sodium salicylate or both. In a third experiment, a comparison was made of the immunizing power of suspensions of killed developing and killed adult trypanosomes in rats challenged with the homologous strain of *T. lewisi*.

It was found that when the crisis is inhibited there is a continued increase in the number of developing trypanosomes, whose inclusions also increase in number, density and refractile power. It was also shown that killed developmental forms with multiple inclusions had a higher immunizing power against re-infection than adult forms with a single inclusion.

In the light of these observations a hypothesis is advanced, according to which the multiple cytoplasmic inclusions of *T. lewisi* contain an antigenic factor stimulating the formation of trypanocidal antibody, with which it reacts to produce the crisis. On the other hand the single inclusion present in adult trypanosomes surviving the crisis possesses different antigenic properties.

C. A. Hoare

GOODWIN, L. G. & RICHARDS, W. H. G. **Pharmacologically Active Peptides in the Blood and Urine of Animals infected with *Babesia rodhaini* and other Pathogenic Organisms.** *Brit. J. Pharmacol. & Chemotherapy.* 1960, Mar., v. 15, No. 1, 152–9, 10 figs. [13 refs.]

"The blood and urine of mice and rats infected with *Babesia rodhaini* contain substances which stimulate the isolated guinea-pig ileum and rat duodenum. The amount of active material excreted increases as the infection increases. The active substances are stable to boiling with hydrochloric acid but not with alkali; they pass through a cellophane membrane and are soluble in hot ethanol. They are destroyed rapidly by papain and less rapidly by chymotrypsin, but are unaffected by trypsin or pepsin. Their action on smooth muscle is not affected by atropine, eserine, antihistamines, iproniazid, bretylium or by lysergic acid diethylamide. The active substances are probably peptides and there is evidence that the urine contains a mixture of peptides, some of which relax and some of which contract the rat duodenum. Similar active peptides appear in the urine of mice infected with *Plasmodium berghei*, *Trypanosoma rhodesiense*, *Streptococcus pyogenes* and Rift Valley fever virus."

ELKELES, G. Über die Chagaskrankheit und das *Trypanosoma cruzi* sowie die anderen amerikanischen Trypansomeninfektionen. [**Chagas's Disease, *Trypanosoma cruzi* and other American Trypanosomiases**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart 1959, Nov., v. 10, No. 3, 268–84, 7 figs. [36 refs.]

The greater part of this paper is devoted to the life cycle and stages of development of *Trypanosoma cruzi* in both the mammalian host and vector, as well as in culture. The author re-affirms the views expressed by him in previous papers [for which the reader is referred to this *Bulletin*, 1945, v. 42, 872; 1952, v. 49, 126]. In addition, he now doubts that Chagas's disease is transmitted by the contaminative method, through the infected faeces of the vector, but suggests that transmission is effected through its bite [but see *ibid.*, 1934, v. 31, 757]. There are also observations on other South American trypanosomes, especially *T. rangeli*, and on Chagas's disease itself. *C. A. Hoare.*

BOCK, M., KOLLERT, W. & GÖNNERT, R. Die Züchtung von *Trypanosoma cruzi* in Gewebekulturen. [**Growth of *Trypanosoma cruzi* in Tissue Cultures**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1959, Nov., v. 10, No. 3, 284–91, 6 figs. [14 refs.]

In view of the conflicting views regarding the life cycle of *Trypanosoma cruzi* in the mammalian host, the authors undertook a study of its development in tissue cultures. For this purpose HeLa cells, in a medium containing TCM 199 with 8% human serum and 2% embryo extract, were infected with cultures of *T. cruzi*. Within these cells the development of this flagellate was similar to that in the tissues of its mammalian host, *viz.* the trypanosome forms were transformed into crithidial forms and these into leishmanial ones; the latter reproduced by binary fission, again giving rise to crithidial forms, which, in their turn, developed into trypanosomes. The complete intracellular cycle in HeLa cells took 6–10 days.

The life cycle of *T. cruzi* in tissue culture is illustrated in a series of figures. *C. A. Hoare*

MÜHLPFORDT, H. Der Einfluss des Darmsymbionten von *Rhodnius prolixus* auf *Trypanosoma cruzi*. [**Influence of Intestinal Symbionts of *Rhodnius prolixus* upon *Trypanosoma cruzi***] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1959, Nov., v. 10, No. 3, 314–27. [25 refs.]

Like other bloodsucking insects, the Reduviid bugs harbour symbiotic micro-organisms in their gut. These are represented by the fungus *Nocardia* (=*Actinomyces*) *rhodnii*, whose presence is necessary for the metamorphosis of these bugs to the adult stage. It has also been proved that the eggs of these bugs are free of symbionts, but these contaminate the outer egg-membrane and infect the larvae when they are hatched. In the present work the author sought to determine the role played by these symbionts in the development of *Trypanosoma cruzi* in *Rhodnius prolixus*.

For this purpose two groups of larvae were used: (a) normal, *i.e.* harbouring the symbiont, and (b) symbiont-free larvae, hatched from sterilized eggs and kept under sterile conditions. The larvae were fed on mice infected with *T. cruzi* and their development in both groups was compared. It was found

that after 7 days the trypanosomes multiplied better in normal bugs than in symbiont-free ones, but after 21 and 35 days their number in the latter group was greater than in the former. On the other hand, there was no difference in the proportion of the various stages (crithidial, leishmanial, metacyclic) developing in normal and sterile insects. *C. A. Hoare*

GOMES DE ALCANTARA, F. Experimentelle Chagas-Kardiopathie. (Quantitative Untersuchungen des intrakardialen Nervensystems.) [**Experimental Cardiopathy in Chagas's Disease (Quantitative Investigation of the Intracardial Nervous System)**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1959, Nov., v. 10, No. 3, 296–303, 9 figs. [10 refs.]

According to the author, the acute phase of Chagas's disease is manifested by severe destruction of the cardiac nerve cells, resulting, during the chronic phase, in a condition described by KÖBERLE as "cardiopathia neurogenica", which is characterized by widespread destruction of the intracardial ganglionic cells.

In the present paper an account is given of a quantitative study of the histopathology of the heart in rats experimentally infected with *Trypanosoma cruzi*, based on numerous sections of this organ, removed at different intervals during the acute and chronic phases of the infection. Counts of ganglionic cells in the heart were made in 3 groups, of 20 rats in each. In the group of normal rats the total number was 110,038 (average 5,501 per heart); in the infected group in the chronic phase of the infection it was 52,853 (average 2,642 per heart), while in the group in the acute phase the following categories of nerve cells were recognized: total number 87,222, of which 50,239 were irreversibly injured, while in 36,983 the damage was thought to be reversible. The findings in rats thus corresponded to those observed in human cases of Chagas's disease. *C. A. Hoare*

SCHWARTZBURD, H. & KÖBERLE, F. Chagas-Myelopathie. [**Myelopathy in Chagas's Disease**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1959, Nov., v. 10, No. 3, 309–14, 1 fig. [12 refs.]

The authors recall the description by Carlos Chagas of "nervous forms" of the disease now bearing his name, and adduce examples upon which they base their view that this trypanosomiasis is characterized by neurological signs and pathological changes. In order to study the histopathology of the nervous system in Chagas's disease, the authors examined and counted all the ganglionic cells seen in serial sections of the spinal cord (fixed in formalin and stained with haematoxylin-eosin) from (a) normal rats and (b) rats infected with *Trypanosoma cruzi* which had recovered from the acute phase of the disease.

The results for the 2 groups were compared and are represented graphically in a table, from which it is seen that Chagas's disease causes widespread destruction of the medullary ganglionic cells in infected rats. This destruction amounted, on the average, to 28% of the cells in the cervical region of the spinal cord, 27% in the dorsal and 35% in the lumbar regions, while in 2 cases 64% and 71% respectively were destroyed in the lumbar regions. The authors consider that these data provide further evidence for regarding Chagas's disease as an infection of the nervous system.

[See also this *Bulletin*, 1960, v. 57, 571 and 572.] *C. A. Hoare*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

KOHNO, S. **Studies on Metabolism of Rickettsiae. I. Studies on Dehydrogenases of** *Rickettsia mooseri*. *Japanese J. Med. Sci. & Biol.* 1959, Oct., v. 12, No. 5, 375–85, 2 figs. [16 refs.]

FUJITA, K., KOHNO, S. & SHISHIDO, A. **The Incorporation of Methionine into Purified Rickettsiae.** *Japanese J. Med. Sci. & Biol.* 1959, Oct., v. 12, No. 5, 387–90, 2 figs.

BELL, E. J. & STOENNER, H. G. **Immunologic Relationships among the Spotted Fever Group of Rickettsias determined by Toxin Neutralization Tests in Mice with Convalescent Animal Serums.** *J. Immunology.* 1960, Feb., v. 84, No. 2, 171–82. [28 refs.]

The toxin neutralization test [this *Bulletin*, 1953, v. 50, 922] was performed by mixing rickettsial toxins (prepared from infected yolk sacs) with dilutions of guineapig antisera for the strains examined, the resulting mixtures containing 2 mouse LD50 doses per 0·5 ml. (an amount sufficient to kill all control mice within 24 hours after intravenous inoculation). Mixtures were kept at room temperature for 1 hour and inoculated intravenously into groups of 4 mice. The serum neutralization titre was taken as the highest serum dilution which prevented death of all 4 mice in a group.

Cross neutralization tests showed that strains chosen to represent *Rickettsia rickettsi* (3) and *R. conori* (4) were readily differentiated. Strains of the same species were markedly homogeneous, the behaviour of the rickettsiae of boutonneuse fever, Kenya tick typhus, South Africa tick typhus and Indian tick typhus suggesting that these agents were closely related to or identical with one another. A rickettsial strain isolated from the rabbit tick *Haemaphysalis leporis-palustris* appeared to be closely related to 3 strains of *R. rickettsi* associated with spotted fever in man, although it differed significantly from one of the latter strains. Rickettsiae of Siberian tick typhus were distinguishable from *R. rickettsi* and *R. conori*; the Siberian agent showed marked one-way cross reactions with rickettsiae from the tick *Amblyomma maculatum* and also with some of the Rocky Mountain spotted fever strains. Antisera against *R. australis* and *R. akari* had little or no neutralizing activity against toxins of 10 other strains of rickettsiae of the spotted fever group. *R. S. F. Hennessey*

GOLINEVITCH, Hélène. A propos de la différenciation de quelques rickettsies du groupe de la fièvre pourprée à tiques. [**Differentiation of Some Rickettsiae of the Tick Typhus Group**] *Arch. Inst. Pasteur de Tunis.* 1960, Mar., v. 37, No. 1, 13–22.

This paper describes briefly the appearance and behaviour in experimental infections of a strain of *Rickettsia conori* isolated from *Rhipicephalus sanguineus* collected in the Black Sea littoral; similar properties were noted in a

strain of *R. sibericus* (isolated from *Dermacentor nuttalli* in Siberia). In cross-complement-fixation tests, strains of *R. conori* and *R. sibericus* showed a close antigenic relationship but were not identical; strains of rickettsiae associated with Kenya tick typhus and Indian tick typhus (isolated from *Haemaphysalis leachi* and *R. sanguineus* respectively) were antigenically indistinguishable from the Russian strain of *R. conori* and differed from *R. sibericus* in a similar fashion. *R. S. F. Hennessey*

HEISCH, R. B. **The Isolation of *Rickettsia burneti* from *Lemniscomys* sp. in Kenya.** *East African Med. J.* 1960, Feb., v. 37, No. 2, 104.

BLANC and BRUNEAU in 1958 isolated *Rickettsia burneti* from *Apodemus sylvaticus* and *Lemniscomys barbarus* caught in the Nefifik Forest, Morocco.

The present author found complement-fixation antibodies in low but significant titre in the sera of 6 out of 8 *L. striatus* caught in a garden some 10 miles from Nairobi. The following year a guineapig was inoculated intraperitoneally with the spleen of a striped mouse from the same place. The guineapig developed fever on the 9th day and its emulsified spleen was inoculated into white mice, many of which showed splenomegaly some 12 days later. Intracellular organisms very suggestive of *R. burneti* were found in smears. Spleens from other infected mice were inoculated into 4 fresh guineapigs which developed fever on the 5th day. Convalescent sera from these guineapigs were positive in the *R. burneti* complement-fixation test at titres of 1/100.

The author stresses the complex nature of the feral epidemiology of Q fever found in sera of 6 other species of animals in Kenya (including 3 rodents) and further details are promised.

The author stresses the complex nature of the feral epidemiology of Q fever in Africa, and points out the need for more extensive studies.

H. J. O'D. Burke-Gaffney

JADIN, J., THOMAS, J. & LÉONARD, J. Fréquence des anticorps agglutinant *Rickettsia burneti* dans l'avortement des Bovidés en Belgique. [**Frequency of *Rickettsia burneti* Agglutinins in Cases of Bovine Abortion in Belgium**] *C.R. Soc. Biol.* 1959, v. 153, No. 11, 1881–2.

One of the authors had noted that the serum of only 30% of aborting cows in Belgium agglutinated *Brucella abortus*, so they sought another cause of the abortion in those animals which were negative serologically. They examined the sera of 169 such serologically negative cows which had aborted and used the rickettsial micro-agglutination test to determine whether *Rickettsia burneti* infection might be present as it had been shown to be in domestic animals in Africa. They had in fact detected *R. burneti* agglutinins in the sera of 3 of 6 aborting cows in Belgium in 1954.

Of the 169 sera from aborted animals free from brucellosis 107 (63·3%) were positive for *R. burneti* in titres from 1/40 to 1/80. In all, 44·3% were regarded as being positive for Q fever, a higher proportion than those positive for brucellosis. The authors conclude that Q fever plays a part in the disease of cattle in Belgium. *H. J. O'D. Burke-Gaffney*

LUOTO, L. **Report on the Nationwide Occurrence of Q Fever Infections in Cattle.** *Pub. Health Rep.* Wash. 1960, Feb., v. 75, No. 2, 135–40, 2 figs. [21 refs.]

Recent surveys of herd milk and sera, with the use of the capillary tube agglutination test to detect antibody to *Rickettsia burneti*, have shown that Q fever occurs among dairy cattle in 35 States of the U.S.A. where a concerted search has been made. "It is likely that infections occur in the remaining . . . unstudied States, most of which are adjacent to or surrounded by infected areas." Herd infection rates ranged from 1 to 65% among the various States; in some areas, nearly 100% of herds were infected. There is evidence of recent spread of the infection in 13 States; the true magnitude of the public health problem has yet to be determined, but "it is difficult to conceive how infections in man, perhaps even now occurring unrecognized, can fail to become even more widespread". *R. S. F. Hennessey*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

BUSTAMANTE, Miguel E. **La fiebre amarilla en Mexico y su origen en America.** [Yellow Fever in Mexico and its Origin in America] Preface by Manuel MARTÍNEZ BAEZ. pp. x + 217 + 15, illustrated. 1958. Mexico: Instituto de Salubridad y Enfermedades Tropicales.

This scholarly work is clearly the fruit of much careful and minute study of the history of yellow fever in the Americas, with special reference to Mexico.

The author's basic thesis is that sylvatic yellow fever existed in Mexico in the earliest years of history, and that it originated in the Americas and was not imported from Africa through the medium of slaves: this conflicts with the historical studies of CARTER some 30 years ago [this *Bulletin*, 1932, v. 29, 245] but the present author takes into account the recent spread of the wave of jungle yellow fever which originated in Panama in 1948 [*ibid.*, 1955, v. 52, 1075] and links this with the earlier historical evidence in support of his thesis. It is however agreed that the urban vector, *Aëdes aegypti*, was imported from Africa and was responsible for initiating the great urban epidemics in the Americas later.

The disease *xekik*, a vomiting of blood, was known to the Maya and the author is convinced that this was what is now known as yellow fever. He refers to early Mexican codices long before the Spanish conquest in which *xekik* is mentioned in 1464, nearly 200 years before the first recorded epidemic of urban yellow fever which occurred in Yucatán in 1648. From this starting point, the author examines documentary evidence, with liberal reference to contemporary writings from the late XV century onwards. He traces the story, century by century, with accounts of outbreaks, up to recent years.

The history of recent decades is illustrated by tabulated data, showing the number of cases and deaths in Mexico by locality and year, until the last single case of urban yellow fever was recorded in Veracruz in 1923.

The continued dangers of jungle yellow fever are stressed, in view of the imminence of spread northwards from Central America in recent years [*ibid.*, 1957, v. 54, 417; 1959, v. 56, 294] and the consequent threat of urban invasion of Mexico and the United States. The need for constant vigilance and precautions is emphasized, particularly in view of development and railway construction which needs special surveillance. There is a list of mammals and mosquitoes which are potential reservoirs and vectors.

The principal interest of this work lies, however, in the historical studies, an aspect which is in itself a tribute to Dr. Bustamante's exhaustive researches and scholarship. For those who are familiar with Spanish it will repay careful reading, especially when it is compared with the classical studies of Carter [*loc. cit.*] in 1931.

[See also Scott, *A History of Tropical Medicine, ibid.*, 1942, v. 39, 798.]

H. J. O'D. Burke-Gaffney

Hallauer, C. Züchtung von Gelbfiebervirus in menschlichen Explantaten. **[The Cultivation of Yellow Fever Virus in Human Tissue Cultures]** *Arch. f.d. gesamte Virusforschung.* 1959, v. 9, No. 3, 428–41. [16 refs.]

The French neurotropic, Asibi and 3 lines of the 17D yellow fever virus multiplied in cultures of HeLa and KB cells to titres of the same order as those attained in mouse brain, and could be carried through up to 60 passages with an easily recognizable cytopathic effect. The strains grew less well in Detroit—6 cells. One of the 17D strains could be carried through 15 passages in a continuous line of human amnion cells; the titres were very variable, however, and the cytopathic effect was irregular and incomplete, often leading to a state of chronic latent infection. The cytopathic effect in HeLa and KB cells was characterized by rounding and detachment from the glass in patches, giving a moth-eaten appearance. KB cells were particularly suitable for detecting yellow fever virus by virtue of their high sensitivity to the virus on primary passage. Data are given for the titres attained in KB cell cultures at various times after infection and at different passage levels. After a few passages in KB cells one of the 17D strains lost its pathogenicity for mice and animals infected with it became immune to subsequent intracerebral challenge. The cytopathic effect produced by yellow fever virus was specifically inhibited by the addition of immune serum, and this effect could be utilized for the titration of neutralizing antibody.

D. J. Bauer

RABIES

Borodina, T. A. **A Study on Viraemia in Experimental Rabies.** *Problems of Virology.* London. 1959, v. 4, No. 2, 96–100. [Translated from Russian.]

3 strains of street virus were used: 1 strain had a titre of 10^{10} in mice, the others 10^{4}–10^{5}. Mice were infected intracerebrally, then bled from the heart at intervals. The blood was inoculated intracerebrally into mice: mice dying were examined for Negri bodies.

Mice infected with 10^{-6} of the high titre strain (Sob-F) were shown to have viraemia 1, 3 and 54 hours after infection and showed symptoms of rabies but not viraemia after 96 hours. Mice infected with 10^{-2} of one of the other

strains had viraemia 18 and 30 hours after infection, and with the third strain 15 minutes, 6 and 40 hours after infection. No viraemia was detected in mice with symptoms of rabies. *C. E. Gordon Smith*

HUYGELEN, C. **Further Observations on the Pathogenesis of Rabies in Guinea-Pigs after Experimental Infection with the Flury Strain.** *Antonie van Leeuwenhoek: J. Microbiol. & Serol.* 1960, v. 26, No. 1, 66–72.

The results of studies on the pathogenesis of rabies in guineapigs after experimental inoculation with the Flury strain into the muscles of the hind leg have already been published by HUYGELEN and MORTELMANS [this *Bulletin*, 1959, v. 56, 528; 1960, v. 57, 238]. In these studies titration of the virus content in different portions of the central nervous system at regular intervals after infection had shown that the virus first multiplied in the lumbosacral cord, thereafter spreading in the direction of the brain; a close correspondence was then noted between the virus titres in these different portions and the course of clinical symptoms—a course characterized by ascending paralysis. The present paper records the results of an investigation made into the dissemination of rabies virus in guineapigs after intramuscular inoculation into the foreleg and after intravenous injection.

For this investigation the author used guineapigs of 300–400 gm. weight and 1-month-old albino mice. The strain Flury virus employed was at its 48th egg passage level and titrated $10^{3 \cdot 85}$ in mice. Intramuscular and intravenous inoculations were alike made with 1 ml. of a 40% chick embryo suspension, the material used for intravenous injection having been clarified by centrifugation before introduction into the dorsal veins of the penis. Suspensions of the different portions of the central nervous system of the guineapigs were made in normal saline and centrifuged for 10 minutes at 1,500 r.p.m.; 4–6 mice were used for each dilution and all mice were observed for 21 days. The results of the experimental work detailed in the text and the conclusions to be drawn therefrom are summarized below.

After intramuscular inoculation into the right foreleg, the virus was first recovered from the cervico-thoracic cord on the 4th post-inoculation day, *i.e.* 2 days before its isolation from other portions of the cord or the brain. From the 6th day on the virus spread rapidly in both directions, to the bulb and brain and to the lumbosacral cord. The earliest symptom observed was paralysis of the inoculated limb (on the 7th post-inoculation day), followed first by paralysis of the opposite limb and later by signs of bulbar and general paralysis. The first segment of the central nervous system to be invaded corresponded, therefore, with the site of inoculation and there was close parallelism between the virus distribution and the clinical symptoms.

Intravenous inoculation into the veins of 8 guineapigs resulted in the death, from a rapidly fatal bulbar paralysis, of 7 of the animals between the 8th and 11th post-inoculation day—a mortality rate comparable with that observed in another experiment, in which 10 out of 11 guineapigs died between the 9th and 12th day after intramuscular inoculation of the virus. In a final experiment in which, after intravenous inoculation, guineapigs were killed at regular intervals up to the 6th post-inoculation day and portions of the brain, bulb, thoracic cord and lumbosacral cord removed for intracerebral injection into mice, results showed that on the 6th day, when virus was present in each portion

of the central nervous system, the concentration of virus was much higher in the brain and bulb than elsewhere. The symptoms and virus distribution indicated, therefore, that after intravenous inoculation the virus first invaded the anterior part (brain and bulb) of the central nervous system.

From the above results the author concludes that both blood and nerves may play a role in the dissemination of rabies virus. *G. Stuart*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

QUAN, S. F.; MILES, V. I.; KARTMAN, L.; PRINCE, F. M. **Ecological Studies of Wild Rodent Plague in the San Francisco Bay Area of California. III. The Natural Infection Rates with *Pasteurella pestis* in Five Flea Species during an Epizootic** [QUAN, MILES & KARTMAN]. *Amer. J. Trop. Med. & Hyg.* 1960, Jan., v. 9, No. 1, 85–90. [21 refs.] **IV. The Fluctuation and Intensity of Natural Infection with *Pasteurella pestis* in Fleas during an Epizootic** [QUAN, KARTMAN, PRINCE & MILES]. *Ibid.*, 91–5, 1 fig. [15 refs.] **V. The Distribution of Naturally Infected Fleas during an Epizootic in relation to their Infection Rates** [KARTMAN, QUAN & MILES]. *Ibid.*, 96–100, 2 figs. [10 refs.]

III. The general lack of data on infection rates for *Pasteurella pestis* in fleas is first emphasized. This type of information is then reported for fleas during an epizootic of plague among field mice in California. Observations covered 6 weeks from March 23rd, 1954.

Malaraeus telchinum accounted for nearly 71% of 2,202 fleas taken, with *Hystrichopsylla linsdalei* forming up to 14% of the catches, and some numbers of seven other species. In all, 111 or 5% of the fleas were positive for plague. The highest infection rate (28 of 247 fleas = 11·3%) was for *H. linsdalei*. Four other species, including *M. telchinum*, had 6·5% or lower infection rates. These are the first records of the finding of plague infection in these five species in nature, though their susceptibility and ability to transmit (with one exception) were already known from laboratory experiment. There was no great difference between infection rates in the sexes of the fleas; but female fleas were more numerous and their greater significance in epizootic transmission is probably real. Susceptibility of the sexes has not always been shown to be similar with other plague vectors, *e.g. Xenopsylla* spp. Both *M. telchinum* and *H. linsdalei* are considered the main vectors in the epizootic, the former on account of its predominance combined with a considerable infection rate, the latter (despite its smaller numbers) for its higher infection rate and since it only was taken infected throughout the 6 weeks. A minor role is assigned to other infected species.

IV. The 111 fleas found positive for plague, reported on in the preceding paper, were separately plated out on blood-agar and inoculated into mice. Most (81%) were shown positive by the former method, the heaviest infections giving confluent colonies, but 19% were so slightly infected as to be demonstrable only *in vivo*. Both the percentage of infected fleas in total flea catches per week

and the heaviest infections in individuals declined from the 1st to the 6th week. There is evidence that the epizootic started in February, reached its peak in the 1st week of these studies, and died out by the 6th week in April. By this time only heavily infected fleas (all *H. linsdalei*) occurred, suggesting these were perhaps to be part of a reservoir system after the epizootic. From a good deal of interesting detail, it emerges that the epizootic was of short duration, probably because the dominant rodent, *Microtus californicus*, is—at least in the area studied—90% resistant to plague, although the suckling mice are susceptible. The numerous fleas, and considerable infections in them, disseminated the disease rapidly among the limited numbers of available susceptible rodents and the epizootic necessarily then declined.

Incidental findings of some interest were: flea faeces from infected fleas was by no means always infected; apparently typical plague bacillus masses could be seen in fleas proven by other means not to be infected. Commonly enough, too, infected fleas may not have detectable masses of bacillus in the proventriculus or gut. These methods are, therefore, not reliable as evidence of whether or not a flea is infected with plague.

V. This paper discusses the yield of fleas and of infected fleas already reported on from the epizootic area, a total area of about 200 ft. x 600 ft., in which rodent traps were arranged on a grid pattern, one trap to every 2,500 square feet. Similar methods were used for investigating certain contiguous areas, but only in certain weeks of the 6 weeks' intensive study of the main area. Other work in 1942, 1954 and later in 1955 showed that sylvatic plague had occurred in circumscribed foci, as close as a few hundred feet from the present epizootic. This paper shows that this present epizootic was also very localized, mainly to loam soil with vegetation of tangled bush. It encroached little into adjacent cultivated land, or heather. Tables and graphs show how in the 6 weeks the percentage of infected fleas and the percentage of traps yielding infected fleas declined, and how the area of the epizootic reduced at the same time from 62,500 to 5,000 square feet. Such dissemination as occurred seemed due to very short range movements of field mice, insufficient to give continuity with other nearby plague foci.

On one occasion, however, a *Rattus norvegicus* was found dead of plague near the edge of the main epizootic area, having come from a rat-infested hog farm in the vicinity. *M. californicus, R. norvegicus, Peromyscus maniculatus* and one house mouse were trapped in the same area and some plague infected fleas taken (mainly on *M. californicus*). Were it not for prompt rat control at the hog farm, the epizootic might have spread, through the movements of infected *Rattus*, beyond its small natural ecological focus and into the hog farm itself.

[For Part I and Part II, see this *Bulletin*, 1958, v. 55, 763, and 1959, v. 56, 42.]

D. S. Bertram

KARTMAN, L. **Further Observations on an Insecticide-Bait-Box Method for the Control of Sylvatic Plague Vectors; Effect of Prolonged Field Exposure to DDT Powder.** *J. Hygiene*. 1960, Mar., v. 58, No. 1, 119–24, 1 fig.

In a previous paper [this *Bulletin*, 1959, v. 56, 610] effective control was reported of the rodent fleas *Malaraeus telchinum* and *Hystrichopsylla linsdalei* on *Microtus californicus* visiting bait-boxes dusted with DDT, flea indices

falling both on these meadow voles and in their nests. This work, done near San Francisco in California, was repeated in 1958–59 in two areas, 250 ft. x 250 ft., and 50 ft. apart. Each area was provided with bait-boxes, and 80 gm. of 5% DDT powder was added to those of one of the areas shortly afterwards. Rodents and their fleas were sampled from July 1958 to February 1959, the treatment of the boxes with DDT being started on July 23rd. Until the end of the experiment, control of both species of flea on the rodents and in their nests remained good and, the particular question in mind, there was no field evidence of DDT resistance.

Tests for DDT in the nests and in tissues of the rodents themselves were positive for the insecticide, one dead vole containing 143 μgm. It is possible that DDT also controlled the voles but, owing to decline in their numbers over much of California at the time, this is not certain. DDT in the nests is stated to have killed flea larvae. *D. S. Bertram*

i. HARVEY, T. L. **Control of the Oriental Rat Flea with Systemic Insecticides fed to Rats.** *J. Econom. Entom.* 1960, Feb., v. 53, No. 1, 167–8.

ii. BENNINGTON, E. **A Systemic Insecticide and Bait for Flea and Rat Control.** *Ibid.*, 169–70. [10 refs.]

Both these papers describe experiments in which systemic insecticide has been fed to rats, *Rattus norvegicus*, and the subsequent effect on the population of *Xenopsylla cheopis* on the rats has been estimated.

i. In the first paper the effects of ronnel, Dowco 109 and dimethoate have been compared. These insecticides were given orally in 1 cc. of 10% alcohol at the rates of 300, 200 and 25 mgm./kgm. of body weight. In one experiment, when newly emerged fleas were confined in containers on treated and untreated rats, significantly more dead fleas were found on the treated rats after 3 days. Fleas on rats treated with dimethoate died more quickly than the fleas on the rats treated with the other insecticides. In another experiment, 2 rats treated with dimethoate and 2 untreated rats were each exposed to 400 newly emerged fleas and after 3 days the treated rats had 52 and 82 live fleas, respectively, compared with 361 and 293 recovered from the untreated rats.

ii. The second paper also investigates the possibility of feeding systemic insecticide to rats by mixing the insecticide with rat baits. A 10% emulsion concentrate of ronnel on soya bean meal was mixed with cornmeal in various proportions. A bait made up of 6 gm. of the ronnel/soya bean mixture added to 1 lb. cornmeal was found to give effective control of fleas after 4 days, but baits made up with less insecticide did not give effective control. As rats were found to prefer untreated bait to bait treated with the effective dosage of insecticide, and above this dosage, the baits were made more palatable by adding 10% sugar and 20 cc./lb. of "liquid-smoke condiment". This bait, with the insecticide dosage increased to 12 gm./lb. of cornmeal, was taken when exposed with untreated cornmeal. When the raticide, fumarin, was mixed in also (in the proportion of 1:49 parts of bait), the 10% sugar, 1:49 fumarin-cornmeal containing 12 gm. of ronnel and 20 cc. liquid smoke per pound was found to be attractive to rats and to kill *Xenopsylla* before the rats died in a feeding period of 5 or more days. *B. R. Laurence*

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

MORGAN, F. M., WATTEN, R. H., BIDYABHED, L. B., VEJASAKDHI, L. P., BANGXANG, E. na & PHILLIPS, R. A. **Treatment of Cholera.** Reprinted from *J. Med. Ass. of Thailand.* 1959, Sept., v. 42, No. 5, 413–22.

This review, based on experience gained in the Bangkok epidemic of 1958, though it contains nothing new, gives much eminently practical advice on the treatment of cholera in the field. It is pointed out that severe cholera still carries a case-mortality of some 60%. The elderly, especially those already suffering from cardiac, renal or liver disease, and the very young are liable to die early of "shock"; later deaths are caused by ischaemic damage to the kidneys, liver and brain.

The technique of treatment here described, simplified to adapt it for use under conditions of emergency outside established hospitals, requires only a supply of fluids for intravenous infusion, bottles of copper sulphate solution of known specific gravity, syringes and needles, an electric or manual centrifuge and vessels in which to collect and to measure stools, urine and vomitus.

It is recommended that the degree of dehydration be estimated by the specific gravity of the plasma [rather than of the whole blood, since cholera patients are frequently anaemic], 200 ml. of isotonic saline being infused very rapidly for each 0·001 elevation of plasma specific gravity above 1·025. Thereafter the rate is slowed to 3–10 ml. per minute. Blood is obtained from a superficial vein, or if these are completely collapsed, from the femoral vein or even artery. After aspiration of blood the needle is left *in situ* and is used for infusion of fluid, unless arterial puncture has been necessary, in which case a vein is cannulated by cutting down on it. The amount of maintenance fluid required after the correction of acute dehydration can be estimated by (i) frequent (2–3 hours) estimations of plasma specific gravity, (ii) estimation of fluid loss in faeces, urine and vomitus, adding 1,200 ml. per 24 hours for insensible fluid loss in a warm climate, (iii) determination of hourly urine output, which requires continuous catheterization in either sex. 60 ml. per hour or over indicates adequate hydration.

Acidosis is likely to occur in acute cholera since the stools contain on the average 45 mEq. of bicarbonate per litre. Its prompt correction is very important. Previous studies had shown that in order to elevate the plasma CO_2 to a normal level of 25 mEq. per litre, 0·58 mEq. of sodium bicarbonate per kgm. body weight was required for each mEq. per litre of depression of plasma CO_2 below this level. This can be infused as either a 2% (240 mEq. per litre) or a 4% (480 mEq. per litre) solution. In the absence of facilities for estimating alkaline reserve, a useful rule of thumb is to give 500 ml. of 2% sodium bicarbonate solution for every 4 litres of saline.

Hypokalaemia often complicates severe cholera, since the stools may contain 16 mEq. K per litre Adequate replacement of this ion is attained by adding 10 mEq. (5 ml. of a 15% solution of KCl) to each litre of infused saline solution. Oral potassium (1–2 gm. daily) should be given during convalescence.

Since the blood in untreated cholera patients is inevitably hypertonic, there is no justification for the administration of hypertonic saline solutions, plasma

and polyvidone. One should rely exclusively on normal saline, 2% sodium bicarbonate and 15% potassium chloride solutions.

A recent study in Bangkok did not suggest that antibiotics or sulphonamides shortened the duration of vibrio excretion, or reduced the severity or duration of the diarrhoea. In this outbreak the maximum duration of the carrier state in 115 patients was 5 days. It is concluded that there is no justification for the addition of antibiotic or chemotherapy to the above measures.

Caution is enjoined in the use of isotonic saline and 2% bicarbonate infusions in infants and small children, and in those with renal and cardiac disease. In them, additional every 2–hours supervision by repeated plasma specific gravity estimations and by measurement of total fluid output is required in order to avoid hypervolaemia leading to pulmonary oedema. When renal damage is shown by oliguria sensible and insensible fluid loss only should be replaced by (5%) solution of glucose in water.

Details of the preparation of the range of copper sulphate solutions for plasma specific gravity determinations, and of their use, are given.

[A summary of this article should be carried by all those liable to be called upon to treat cholera in the field.] *J. H. Walters*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

SHAFFER, J. G. & KEY, Iris. **The Ingestion of Bacteria and of Altered Bacterial Structures by *Entamoeba histolytica* in Shaffer-Frye and in Modified Shaffer-Frye Media.** *Amer. J. Trop. Med. & Hyg.* 1960, Mar., v. 9, No. 2, 175–9, 2 figs.

From previous studies on the growth requirements of *Entamoeba histolytica* by the authors [this *Bulletin*, 1948, v. 45, 786 ; 1953, v. 50, 112 ; 1955, v. 52, 692 ; 1960, v. 57, 125 and others] it has been concluded that bacteria accompanying this organism in culture provide some necessary growth factors. The nature of the materials or how amoebae obtain them is not known, but when penicillin is present round bodies are produced by the bacilli and are ingested by amoebae and it was thought that this was the nutrient source. It was subsequently reported that bacteria themselves were ingested.

The bacterial cultures used in the latter case as well as the one in which round bodies appeared along with another related culture have now been tested. The authors came to the conclusion that particles engulfed by *E. histolytica* do not necessarily contribute to the nutrition of the amoebae, whether they be red cells, starch or bacteria. It appeared that the above changes in bacteria induced by penicillin were characteristics of the bacteria and not affected by the medium employed. *J. D. Fulton*

JARUMILINTA, R. & MAEGRAITH, B. G. **Hyaluronidase Activity in Stock Cultures of *Entamoeba histolytica*.** *Ann. Trop. Med. & Parasit.* 1960, Apr., v. 54, No. 1, 118–28, 2 figs. [11 refs.]

The authors have used three strains of *Entamoeba histolytica* normally kept in culture and demonstrated that hyaluronidase was present in each. They were

all pathogenic to guineapigs when inoculated intracaecally. The amoebae were collected by centrifugation, washed and then suspended in known numbers in buffered saline; extracts of amoeba prepared by freezing and thawing were also used to determine if the enzyme was present. The estimations were made by three different methods, namely by reduction of viscosity, by a turbidimetric and by a chemical method with the use of hyaluronic acid as substrate.

The authors concluded that their results indicated the presence of hyaluronidase in all three live strains as well as in the extracts obtained from them. It was not determined whether there was a correlation between the presence of hyaluronidase activity and pathogenicity.

[See also this *Bulletin*, 1953, v. 50, 1138; 1954, v. 51, 584.] *J. D. Fulton*

GOLDMAN, M. **Microfluorimetric Evidence of Antigenic Difference between *Entamoeba histolytica* and *Entamoeba hartmanni*.** *Proc. Soc. Exper. Biol. & Med.* 1959, Oct., v. 102, No. 1, 189–91.

The author has shown previously [this *Bulletin*, 1955, v. 52, 46] that *Entamoeba histolytica* and *E. hartmanni* can be distinguished by their staining reaction when treated with fluorescein-labelled antisera. In the present paper a method is described whereby the fluorescence of these amoebae can be assessed quantitatively. For this purpose strains of *E. histolytica*, *E. hartmanni*, *E. coli* and *E. moshkovskii* were exposed to fluorescent anti-*E. histolytica* and fluorescent normal globulin, after which their fluorescence was accurately measured with a microfluorimeter. It was demonstrated that 4 strains of *E. histolytica* reacted similarly but differed markedly from the other species of entamoebae. Moreover, among the *E. histolytica* strains there was a significant difference between 3 invasive ones and a non-invasive strain. The test in question thus provided quantitative evidence of a species distinction between *E. histolytica* and *E. hartmanni*. *C. A. Hoare*

GOLDMAN, M. **Antigenic Analysis of *Entamoeba histolytica* by means of Fluorescent Antibody. I. Instrumentation for Microfluorimetry of Stained Amebae.** *Exper. Parasit.* New York. 1960, Feb., v. 9, No. 1, 25–36, 8 figs. [16 refs.]

The paper describes a microfluorimeter to measure the amount of light emitted by *Entamoeba histolytica* after staining by means of fluorescent antibody. The method has been used in the antigenic analyses of the parasite and as an aid to its recognition, for it is known that *E. histolytica* and *E. coli* can be distinguished by this means [this *Bulletin*, 1955, v. 52, 46]. Quantitative data are provided on the results obtained with 2 different light sources. The difficulties inherent in objective measurements of fluorescence are recognized.

Photographs of the apparatus accompany the description under the headings Photometer, Microscope, Light Sources and Filter Systems and Miscellaneous Items, including use of an opal screen required when the fluorescence of small volumes of solutions had to be measured. Stable sources of light were required. Allowance for fading of fluorescence of stained organisms during examination had to be made and depended in part on the light source, on the area examined and also on the density of fluorescence present.

By the methods described comparable measurements of the light emitted by fluorescein-stained amoebae can be obtained. Future work will describe a standardized method for staining the amoebae. *J. D. Fulton*

Waks, J. Aspectos clínico-experimentales y farmacológicos del 11925 C y su actividad amibicida. [**Clinical and Pharmacological Studies of 11925C and its Amoebicidal Activity**] *G.E.N.* Caracas. 1959, July–Dec., v. 14, Nos. 1/2, 9–16, 7 figs.

The author, from Buenos Aires, gives details of studies of Entobex *in vitro*, including amoebicidal, antibacterial and toxic effects: there are 7 illustrative microphotographs.

He then records the treatment with this drug of 248 patients (184 adults and 64 children aged 9 to 15 years). The drug was obtained in enteric coated tablets each containing 50 mgm. of the active preparation. Adults were given 1 tablet on each of the first 5 days, 2 daily from the 6th to 15th days and 3 daily from the 16th to the 20th days. Stools were examined daily during treatment and thereafter every 2 weeks.

Amoebae disappeared from the faeces in 209 cases (84·27%) between the 7th and 15th day and in 19 more (7·66%) by the 20th day. The remaining 20 patients then had a second course and all but 4 were cleared; 3 of the last suffered from intolerance (tachycardia, petechiae, severe vomiting), and the fourth was resistant to 5 courses of treatment. Side effects, including (in addition to those mentioned) headache, diarrhoea, nausea, haematuria and diplopia, occurred in 19 patients (7·62%).

While the drug destroyed the amoebae in the intestine and modified the bacterial flora, the author emphasizes the distinction between destroying the amoebae in the intestine and curing the disease. Follow up for a year is planned. *H. J. O'D Burke-Gaffney*

Mehta, S. P., Padaria, F. T. & Rathi, M. M. **Diloxanide ("Entamide") in the Treatment of Amoebiasis.** *J. Trop. Med. & Hyg.* 1960, Apr., v. 63, No. 4, 93–5.

24 patients were treated for intestinal amoebiasis in Bombay with this anilide derivative. Diagnosis was based on recovery of the parasite from the bowel by rectal swabs and stool examinations. Treatment was the [oral] administration of 20 mgm./kgm. body weight diloxanide for 10 days. 17 patients were stool-negative by the last day of the treatment, but 7 of the 24 were still passing cysts. Of the 17 only 9 remained stool-negative on daily examination over 1 to 2 weeks; 7 of these 9 were observed further, and another of them became stool-positive within 4 weeks; 2 of the remaining 6 were under observation until the end of the 6th week, and these remained stool-negative. There were no side effects of the treatment. The authors consider the drug to be a useful and safe amoebicide [though it cured (as defined) only one-third of the patients treated with it]. The livers of 2 patients were enlarged; they were not reduced by the treatment. *A. R. D. Adams*

NIEDMANN, G. Ensayo de la terapéutica de la amibiasis intestinal crónica con Dicloroaceto-4-hidroxi-N-Metilanilida (Entamide). [**Treatment of Chronic Intestinal Amoebiasis with Entamide**] *Bol. Chileno de Parasit.* 1960, Jan.–Mar., v. 15, No. 1, 8–10. English summary.

The author, in Chile, treated 31 ambulatory patients having proved amoebiasis with Entamide in a dosage of 0·5 gm. three times daily for 10 days. 15 additional patients received 1 gm. three times daily for the same period. Stool examination at 10, 30 and 90 days after treatment showed, respectively, 61%, 73% and 67% of negative results in patients having the lower dose and 57%, 82% and 78% in those receiving the higher dose. This suggests to the author that the drug has some prolonged and residual anti-amoebic activity, but the result may also be related to the follow-up in 3 stages.

Side effects were few and slight. The author considers that Entamide is a useful drug in chronic intestinal amoebiasis. *H. J. O'D. Burke-Gaffney*

BELL, S. & WOODRUFF, A. W. **Humatin in Intestinal Amebiasis.** *Amer. J. Trop. Med. & Hyg.* 1960, Mar., v. 9, No. 2, 155–7.

Paromomycin (Humatin—Parke, Davis & Co.) [see this *Bulletin*, 1959, v. 56, 1238; 1960, v. 57, 244 and 245] was given to 20 patients in London who were passing cysts of *Entamoeba histolytica* in their stools. The drug was given orally in capsules in divided doses amounting to 30 mgm./kgm. body weight daily, over 10 days. The mean time for disappearance of parasites from the stools in the case of 14 of the patients was 3·7 days. 19 of the patients returned irregularly for re-examination for periods ranging from 1 month to a year after treatment; one of these was stool-positive 1 month after treatment; the others remained stool-negative (average about 3 stool examinations). In one patient with visible haemorrhagic lesions in the lower bowel, though parasites vanished from the stools the lesions persisted; they completely cleared with emetine bismuth iodide treatment. The only detectable side effect attributable to the drug was a mild diarrhoea; this developed in 6 patients and ceased within a few days of completion of the treatment: no blood or urinary changes occurred.

A. R. D. Adams

WAKS, J. Aspectos clínico experimentales sobre el sulfato de humatín y su actividad amibicida. Comunicación previa. [**Clinical and Experimental Studies of Humatin Sulphate and its Amoebicidal Action**] *Semana Méd.* 1959, Dec. 31, v. 115, No. 27, 1075–6. English summary (9 lines).

The author, in Buenos Aires, used Humatin sulphate received from the Parke, Davis laboratories in the treatment of 48 confirmed cases of amoebiasis: the patients were aged 7 to 68 years. Tables indicate that this drug was amoebicidal *in vitro* at a concentration of 2.5 mgm. per cc. and " bacteriolytic " on 4 species in minimum concentrations of 1/20,000 to 1/60,000.

Stools were examined by Faust's method and by stained smears daily for 20 days and examinations are continuing every 15 days for 6 months [this is a preliminary note].

The dose for adults was 150 mgm. thrice daily after meals for 15 days, with a proportionate reduction for children.

In 39 patients amoebae disappeared from the stools in 6 to 10 days and in 6 others in 15 days. The remaining 3 received a second course and 2 of them

were freed of parasites. The last patient was not cured by 3 courses of treatment. Side effects occurred in 6 patients and included nausea, vomiting, diarrhoea, petechial rash and joint pains. It is stated in the conclusions that the drug did not produce toxic effects in the blood or kidneys.

H. J. O'D. Burke-Gaffney

Reboul, E., Pereira & De Beranger. Traitement des colites amibiennes, méta-amibiennes et aparasitaires par le 6753 R.P. A propos de 50 cas cliniques. [**Treatment of 50 Patients suffering from Amoebic and Non-Parasitic Colitis with 6753 RP**] *Maroc Méd.* 1959, Dec., v. 38, No. 415, 1598–602.

6753 RP is composed of a mixture of diphetarsone and spiramycin [see this *Bulletin*, 1958, v. 55, 405]; the former is claimed to be directly amoebicidal while the latter has a selective action on aerobic and anaerobic Gram-positive bacteria.

33 patients in Morocco passing amoebae or cysts of *Entamoeba histolytica* were treated with the drug and their stools were free from parasites on completion of the treatment. Another 17 patients with colitis of varied causation also were similarly treated. All benefited clinically from the treatment and most were relieved of their troubles after it; side effects were negligible.

A. R. D. Adams

Woody, N. C. & Woody, Hannah B. **Balantidiasis in Infancy. Review of the Literature and Report of a Case.** *J. Pediatrics.* St. Louis. 1960, Apr., v. 56, No. 4, 485–9, 1 fig. [49 refs.]

"*Balantidium coli* infection in a malnourished 5-month-old infant was treated with carbarsone, resulting in eradication of the parasite. She is believed to be the youngest patient with this condition on record.

"The disease may be encountered in all parts of the world. Air travel may increase opportunities for exposure. Unless considered, it can be overlooked as a cause of diarrhoea. Immediate, proper examination of fresh stools should easily reveal the trophozoites in acute cases.

"At present, treatment with tetracyclines appears to be the preferred method.

"The epidemiology of balantidiasis is still obscure."

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

WHO Chronicle. 1960, Jan., v. 14, No. 1, 3–39, 33 figs. & 2 maps. [Refs. in footnotes.] **International Work in Leprosy, 1948–1959.**

In July 1948 the first World Health Assembly decided that the subject of leprosy should be given number 6 priority, and in 1951 an Expert Advisory Panel on Leprosy had been set up from which an Expert Committee was

convened in 1952 to study the status of sulphone therapy. This article gives a brief account of the role played by WHO from 1948 up to last year, and includes a description of the disease itself, its place in history, and a well-illustrated appendix on the differential diagnosis of leprosy. Following the recommendations of the Expert Committee on Leprosy, WHO has continued and intensified its policy of helping countries where leprosy is endemic. It encourages the study of local patterns of leprosy with the help of short-term consultants whom it sends out to help advise the government concerned. Consultants have already visited 13 countries in Africa, 12 in the Americas, 5 in the Eastern Mediterranean, 4 in South-East Asia, and 5 in the Western Pacific. WHO also seeks to improve local staff engaged in leprosy campaigns by means of fellowships, and with the help of UNICEF promotes local campaigns. In many countries experience has shown that a pilot project in a limited area is the best way to start a campaign, during which personnel can be trained. By 1958 progress had been made in 13 leprosy control projects jointly assisted by UNICEF and WHO. Projects should be long-term with international assistance for at least 5 years, with the help of a WHO expert for at least 2 years followed by repeated visits.

Mention is made of a seminar held in Brazil in 1958, of the Inter-Regional Leprosy Conference at Tokyo in November 1958 (following the 7th International Congress), and of the leprosy conference held in Brazzaville in April 1959 under the joint auspices of WHO and the Commission for Technical Co-operation in Africa South of the Sahara (CCTA).

It is hoped to publish this article in the form of a booklet as one of a series of studies devoted to different fields of WHO activity.

A table is given of 54 fellowships in leprosy given by WHO between 1950 and 1958, the number in any one year rising from 1 in 1950 to 17 in 1957 and 15 in 1958. These are given to suitable workers chiefly from the countries mentioned above.

A world map shows the location of the various projects undertaken and the stage to which each has progressed; details of a few of these projects are given.

Ernest Muir

De Campos, E. C. Correlação e antagonismo lepratuberculose. Alguns aspectos estatísticos observados no Estado do Rio Grande do Sul. **[Correspondence and Antagonism between Leprosy and Tuberculosis. Some Statistical Aspects observed in the State of Rio Grande do Sul]** *Rev. Brasileira Leprologia.* S. Paulo. 1959, July–Sept., v. 27, No. 3, 117–28, 5 maps. [39 refs.]

Statistics are given of the new cases of leprosy registered, and of the new cases of tuberculosis and deaths from that disease registered, during the quinquennium 1954–1958 in each of the 11 Regions of the State.

It is observed that, in general, in those Regions where the incidence of tuberculosis is highest, that of leprosy is low, and where leprosy is most intense there is less tuberculosis. Thus the coefficient of morbidity from tuberculosis in Campanha is 168·8 with a mortality of 40·2, and the leprosy coefficient is 2·3; whereas in Missões with a morbidity of 29·6 and mortality of 16·3 from tuberculosis, the incidence of leprosy is 7·5.

Although it cannot be scientifically proved that the presence of tuberculosis in greater measure is the cause of the lower incidence of leprosy, yet this

evidence and similar evidence from other countries points in that direction; and supposing this to be at least an important factor, it should be possible by means of vaccination with BCG to increase resistance to leprosy in those patients who are at present anergic. *Ernest Muir*

LANGUILLON, J., BOURREL, P., BOISSAN, R. H. & PICARD, P. Contribution à l'étude des perforants plantaires lépreux. Distribution, étiologie, pathogénie. Complications et traitement. [**Study of Leprous Perforating Ulcers: their Distribution, Aetiology, Pathogenesis, Complications and Treatment**] *Méd. Trop.* Marseilles. 1960, Mar.–Apr., v. 20, No. 2, 219–55, 7 figs. [90 refs.]

This long article is the result of a study of more than 3,000 cases of leprosy. Out of 403 leprosy patients with perforating ulcers only 22 suffered from the lepromatous form of the disease, the rest being tuberculoid or undifferentiated.

In 76·8% the ulcers occurred in the front of the sole. The physiology of walking is studied with regard to the location of ulcers, showing the points of pressure on the sole and liability to injury. Next, a radiological study of the foot is made, showing that in 70·5% of patients there is subjacent osteo-arthritis, but that the proportion with this is greater in men than in women. There is then an extensive study of the neurological factors associated with perforating ulcers, showing the innervation of the dorsal and plantar aspects of the foot, and the various forms of anaesthesia. It is shown that plantar anaesthesia is not always a necessary condition as sensation was retained in 18·6% of patients with ulcers, and there was a total anaesthesia in only a quarter of the cases.

Bacteriological examination showed that lepra bacilli were present in 26·5% of patients with ulcers.

Blood examination showed that there was no evidence of calcium or phosphorus deficiency as a possible cause of perforating ulcer.

Various forms of treatment are discussed: disinfectant, antibiotic, treatment based on destruction of lepra bacilli, trophovascular treatment, treatment with cicatrizants and with various vitamins. It is concluded that all these have a very limited effect, and that the two most important factors for healing are immobilization and the removal of subjacent osteo-arthritic lesions.

Lastly, various surgical procedures are considered: for the removal of bone, for the planting of grafts, for amputations, etc. There is no clear evidence that surgery of the sympathetic is of value. The reparative work of FRITSCHI and BRAND [this *Bulletin,* 1958, v. 55, 413] to repair deformities by tendon transplantation is mentioned, and its secondary beneficial effect on perforating ulcers. *Ernest Muir*

TERENCIO, J. & TARABINI CASTELLANI, J. La dexametasona en el tratamiento de las leprorreacciones. [**Dexametasone in the Treatment of Lepra Reaction**] *Rev. "Fontilles".* Alicante. 1959, July–Dec., v. 4, No. 8, 665–76, 10 graphs.

After describing their previous methods of treating lepra reaction with corticosteroids, prednisone, etc., the authors give details of 10 patients (7 of them male and 3 female) who had proved intractable to other methods. Excellent results were obtained with the use of Dexametasone (Millicorten, Ciba) in a

daily dosage not exceeding 4 mgm. In all but one patient the temperature came down within 24 hours, and the other symptoms subsided rapidly. With other corticosteroids there was a tendency for the patient to become a slave of this treatment, the reaction relapsing when administration was stopped. In 3 of the above patients the reaction would not yield to cortisone or prednisone but yielded at once to Millicorten. Better results were obtained with men than with women, which is put down to hormonal disturbances connected with menstruation. *Ernest Muir*

LECHAT, M. F. L'utilisation pratique de l'Etisul (diéthyl-dithiolisophtalate) pour le traitement de la lèpre chez l'Africain. [**The Practical Use of Etisul (Diethyl dithiolisophthalate) in the Treatment of Leprosy among Africans**] *Ann. Soc. Belge de Méd. Trop.* 1959, Dec. 31, v. 39, No. 6, 865–76.

The object of this trial was to test the tolerance of African leprosy patients to application of Etisul by inunction. After referring to the work of DAVEY with this drug [this *Bulletin*, 1959, v. 56, 1146] the author describes his own experience in treating 28 patients over periods of from 8 to 15 weeks. Application was made twice or thrice a week. The patients sat round in a circle and each one rubbed in 3 gm. of the preparation into the back of the patient in front of him, applying friction from the waist to the shoulders for 20 minutes. The back was left uncovered for 3 hours, after which the patient washed. Etisul applied in this way was tolerated well, the patients continuing enthusiastic about the treatment throughout the entire course. There were, however, 2 patients who developed severe reaction and had to stop, and 2 others left the leprosarium.

In a description of the results of treatment the patients are divided into 2 groups. In the first there were 7 patients who were treated simultaneously with DDS and Etisul. The bacteriological improvement appeared to be considerably better than in control subjects. In the second group there were 11 patients on combined Etisul and DDS treatment, and 4 on Etisul alone. The results over the period of the experiment were inconclusive, though in some cases patients became bacteriologically negative within a few weeks. The smell of the preparation was not found in practice to be an impediment. *Ernest Muir*

MONTESTRUC, E. Quelle est la part de la réaction de Mitsuda dans les critères du blanchiment et de la cessation du traitement des malades atteints de lèpre. [**What is the Place of the Mitsuda Reaction in judging of the Recovery of the Leprosy Patient and deciding whether he may stop Treatment**] *Bull. Soc. Path. Exot.* 1959, Nov.–Dec., v. 52, No. 6, 742–6.

The author describes 130 patients and the percentages with positive Mitsuda reactions either originally or after treatment for periods up to 10 years. Of 90 lepromatous cases 8·8% became positive; of 24 tuberculoid cases 95·8% were positive; of 16 indeterminate cases 68·7% were or became positive. It is concluded that if a patient with the tuberculoid type has a negative Mitsuda reaction it is a contra-indication to stopping treatment. In the indeterminate type a negative Mitsuda indicates continuation of treatment; when the Mitsuda is positive other criteria for stopping treatment may be used; in the lepromatous it is not possible to fix the duration of treatment when the Mitsuda is negative

as it generally is, but, provided the conditions of arrest of disease as laid down at the Tokyo and Brazzaville conferences are observed, and the patient remains under medical supervision and periodic examination, interruption of treatment may be allowed in those who are lepromin-positive. *Ernest Muir*

De Menezes, D. Comentáros e sugestões de uma campanha anti-leprótica baseados em nossa experiência de 21 anos no dispensário de Uruguaiana. [**Comments and Suggestions on an Antileprosy Campaign based on 21 Years' Experience of a Uruguay Dispensary**] *Rev. Brasileira Leprologia.* S. Paulo. 1959, July–Sept., v. 27, No. 3, 144–53.

Out of 101 leprosy patients enrolled from 1939 to 1959 the source of infection was discovered in only 33. 65·2% of the patients were found by the skin diseases service, and 22·8% were found by examination of contacts with other leprosy patients.

Out of 316 contacts who have been vaccinated with BCG only 1 has developed leprosy, while of 134 who have not received BCG, 32 have become patients. None of 246 contacts who were lepromin-positive has shown the disease during 10 years, while of 181 contacts in whom the lepromin reaction was not tested 14 have become patients during that period. Generally, in Uruguay, it is found that while scarcely 3 per 1,000 develop leprosy among those leprosy contacts who have been vaccinated with BCG, 239 per 1,000 have contracted leprosy among those who have not been vaccinated.

Suggestions for the campaign against leprosy are outlined. *Ernest Muir*

Silva, C. & Neto, A. R. Influência da vacinação pelo BCG sôbre a lepromino-reação em pessoas sadias comunicantes e não comunicantes de casos de lepra. [**The Influence of Vaccination with BCG on the Lepromin Reaction in those who have been and in those who have not been in Contact with Leprosy**] *Rev. Brasileira Leprologia.* S. Paulo. 1959, July–Sept., v. 27, No. 3, 129–43, 3 figs. [16 refs.]

The series of experiments continued over a period of years since 1952. BCG was administered orally at intervals of 15 days in doses of 200 mgm. each, the subjects being healthy persons (mostly children) who had been in contact with leprosy. They were all initially non-reactant to lepromin. Controls consisted of similar subjects who did not receive BCG. The lepromin reaction was repeatedly tested after the vaccination at irregular intervals.

It was found that in both groups the lepromin reaction fluctuated between negative and various degrees of positivity. The authors therefore conclude that there are serious restrictions to the prophylactic effects of BCG in leprosy, at least when it is administered in the above manner to those who are initially lepromin negative. *Ernest Muir*

Kato, L. & Gozsy, B. **Reticuloendothelial Response in Murine Leprosy.** *Internat. J. Leprosy.* Wash. 1959, Oct.–Dec., v. 27, No. 1, 347–54.

Groups of rats were inoculated subcutaneously with a suspension of rat leprosy bacilli and then at intervals the capillary endothelial and reticuloendothelial responses of the animals were measured. These responses were

measured: (1) by comparing the rate of clearance of carbon from the circulation after the intravenous injection of India ink, and (2) by the amount of the carbon that diffused into an area of skin injected with histamine and into the oedematous areas of the extremities produced by the injection of dextran. Half of the animals of each group were depleted of 5-hydroxy-tryptamine (5HT) by the injection of reserpine.

In the animals examined 20 days after infection, *i.e.* before palpable lesions had developed, little or no accumulation of carbon occurred in the infected site either before or after the development of the dextran oedema. In the histamine-injected sites there was marked accumulation of carbon both before and during the stage of dextran-oedema, irrespective of whether there was depletion of 5HT or not; this effect was in marked contrast to that in uninfected animals, where except for the slight accumulation that occurred before the oedema developed and in animals in which there was no 5HT depletion, there was lack of concentration at the histamine sites. Accumulation of carbon also occurred in the extremities of the infected animals not depleted of 5HT, especially during the oedema stage; in uninfected animals accumulation occurred at these sites only during the pre-oedema stage and in those depleted of 5HT it was very slight. The rate of clearance of the carbon from the circulation was the same in both the infected and uninfected animals, and the depletion of 5HT did not affect it, but it was delayed in the animals with dextran-oedema.

In animals examined 70 days after infection, when the lesions were well developed, there was marked accumulation of carbon at the infection site provided that the animals were not depleted of 5HT, and at this stage there was still the remarkable difference, although less marked, between capillary behaviour in the infected and uninfected animals. By the 120th day, when the lesions were necrotic there was no difference in the carbon accumulation between the infected and uninfected animals and no accumulation occurred at the leproma sites.

These results are interpreted as showing a fluctuation in capillary response during the infection. During the earlier stages of the infection the capillary endothelium is activated by minute doses of histamine or by the anaphylactic substance, dextran, even during the presence of oedema or depletion of 5HT; this altered response can be regarded as a readiness of capillary endothelial cells to combat injury. As the lesions develop, however, the response wanes. Apart from the altered capillary response these experiments demonstrate no change in the phagocytic properties of the reticuloendothelial system.

S. R. M. Bushby

MAURI, A. C. Associação de Estreptomicina e de diamino-difenil-sulfona (DDS) no tratamento da lepra murina. [**Association of Diamino-diphenylsulphone (DDS) and Streptomycin in the Treatment of Murine Leprosy**] *Rev. Inst. Med. Trop. São Paulo.* 1960, Jan.–Feb., v. 2, No. 1, 5–7.

The English summary appended to the paper is as follows:—

"The concomitant administration of diamino-diphenylsulfone and streptomycin to rats inoculated with the Stefansky bacillus caused more pronounced and more rapid regression of lesions than the isolated use of the sulfone.

"The evaluation of the results was accomplished by comparing the macroscopic and histological aspects of the lesions and the average duration of life

of animals treated with both drugs and with the sulfone alone. The results obtained justify the conclusion of the existence of a potentiating action between diamino-diphenylsulfone and streptomycin in the treatment of the experimental murine leprosy."

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (*schistosomes, other flukes*); CESTODES (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); NEMATODES (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

VINKE, B. & VAN DER SAR, A. **Dithiazanine, a New Anthelminthic.** *Trop. & Geograph. Med.* Amsterdam. 1959, Dec., v. 11, No. 4, 335–8.

Dithiazanine, a blue, highly insoluble dye [this *Bulletin*, 1960, v. 57, 264, 499], appears to be free from systemic toxic effects and to have a wide range of activity against helminths during the alimentary phase of their life. It should be remembered, however, that the drug cannot influence the tissue phases of such parasites as *Strongyloides, Ancylostoma* and *Ascaris*.

The authors describe their experience with this drug on the island of Curaçao. They used standard dosages, 200 mgm. three times a day for 5 days in the case of adults (16 adults, however, received half this dose for 10 days) and 100 mgm. t.d.s. for 5 days for those of 12–16 years of age. Stools were examined by Telemann's concentration method for ova after administration of a laxative. The following results were obtained:—

(a) *Trichuris*: 133 patients, 115 cleared;
(b) *Hymenolepis nana*: 8 patients, all cleared;
(c) *Giardia intestinalis*: 24 patients, 22 cleared;
(d) *Strongyloides*: 23 patients, all cleared, though 1 relapsed after 3 months but was cured by a second course;
(e) *Ascaris*: 6 patients, 5 cleared;
(f) *Ancylostoma duodenale*: 20 patients, 10 failures.

The reservation is made that proof of cure was not absolute in this series since the follow-up period was short and there was a constant risk of reinfection.

Since dithiazanine has been shown to cause gastric irritation in dogs, and is therefore dispensed in enteric-coated tablets, the authors directed their attention to the incidence of vomiting among their patients. This occurred in 33%, usually on the first or second day. Those with gastric achlorhydria showed no greater tendency to vomit than those with a normal acid production. Reduction of the initial dose did not diminish the tendency to vomit early in the course of treatment, but chlorpromazine was usually successful as a suppressant. Diarrhoea occurred in 6 patients: one of these patients excreted a greenish urine during drug administration, but this pigment did not appear to be dithiazanine.

J. H. Walters

ROSANELLI, J. D. **Some Observations on Vesical Schistosomiasis in Acholi District, Uganda. Work carried out at the Uganda Medical Department's Hospital at Gulu and in Acholi District.** *East African Med. J.* 1960, Feb., v. 37, No. 2, 113–16.

Vesical schistosomiasis has rarely been reported from the Acholi district of Uganda, though it is common in the adjacent and geographically similar Lango district. The author reports the discovery of a small focus on the Odek river, which was found to contain snails of the species *Physopsis nasuta* [*Bulinus nasutus*], some of which contained bifurcate cercariae.

A survey of schoolchildren in 2 villages, Odek and Dino (representatives of the adult population were included in the latter survey) by a single examination of the centrifuged urinary sediment, showed incidences of infection with *Schistosoma haematobium* of 17% and 16·5% respectively. A similar investigation carried out at Awere, on the apparently uninfected Aswa river, confirmed the absence of the parasite in this population. Stool samples from all three regions showed an absence of *S. mansoni* ova.

The author noted that there was a much higher incidence of splenomegaly (36·7%) and hepatomegaly (18·1%) in Odek children than in those from the schistosomiasis-free Awere village, where the incidences were 19% and 8% respectively after correction for the lower incidence of malaria in the latter.

The author maintains that in practice the chemical examination of the urine in a test-tube for blood is the simplest and most practical method of detecting children who require treatment, and that an excess of epithelial cells in the urine of all but pregnant women is strongly suggestive of schistosomiasis and indicates the need for a further search for ova. His third point is that *Schistosoma haematobium* infection is a potent cause of hepatosplenomegaly in children in an endemic area, though no ill effects on the general health are apparent.

J. H. Walters

CHADLI, A., PHILIPPE, E. & ZIRAH, P. La bilharziose urétérale. A propos d'une observation. [**Ureteral Schistosomiasis. Report of a Case**] *Arch. Inst. Pasteur de Tunis.* 1960, Mar., v. 37, No. 1, 81–101, 2 figs. on pl. [Numerous refs.]

A full discussion of the condition, with reference to the literature, and account of a case in a man of 29 in Tunisia.

PRATES, M. D. & GILLMAN, J. **Carcinoma of the Urinary Bladder in the Portuguese East African with special reference to Bilharzial Cystitis and Preneoplastic Reactions.** *South African J. Med. Sci.* 1959, July, v. 24, Nos. 1/2, 13–40, 1 chart & 44 figs. on 8 pls. [55 refs.]

In this further detailed and most careful study of carcinoma of the bladder [this *Bulletin*, 1958, v. 55, 1381], the authors have set out to determine the frequency of the various histological types of carcinoma in Portuguese East Africans and to relate their findings with the changes in the bladder due to the presence of schistosomal ova. Of 139 cases of carcinoma of the bladder seen at Lourenço Marques, 100 were found to be histologically suitable for classification according to the method of DUKES and MASINA. Most of the material came from autopsy, and 59% examined were squamous carcinoma, 21% papillary transitional cell type, 13% were anaplastic and 7% were solid

transitional cell type. This preponderance of squamous carcinoma (rare in the U.K. and less common in the U.S.A.) is found also in Egypt and South Africa and needs explaining. The authors go on to examine the long-held belief that there is a direct relationship between schistosomal cystitis and carcinoma of that organ. They found that squamous metaplasia of the mucosa was present (either in the tumour area or elsewhere) in 43% of their patients and that schistosomal ova were found in 33%. They point out that the absence of demonstrable ova in serial sections is not proof of their absence from the tissues since a far higher proportion of positive findings occurs after digestion of tissues. An important point they make is that the percentage of squamous carcinoma remains the same for all age-groups in their series.

The authors next examined the material from 478 consecutive post mortems of Africans not suffering from carcinoma of bladder in order to determine the frequency of schistosomal lesions in these non-cancerous bladders. The rate was below 20% for the under 10 age-group, but rose to about 70% in each sex for the 20–30 group. It rose further to around 80% in males and then slowly dropped to around 60% in both sexes for the higher age-groups. Live worms were present in 10–20% of patients and there was a cellular reaction in the bladder wall in from 10–40% according to age. In roughly half this number the disease had progressed to polypoid formation.

There is a bewildering variety of macroscopical lesions in schistosomal cystitis and the picture is further complicated by frequent re-infection and added bacterial infection. The authors have attempted to sort out the many described lesions and to correlate these with the histopathology. Using this very large series for comparative study they suggest a scheme (accompanied by an ingenious diagram) to show the possible stages in the natural history of schistosoma infection of the bladder and the interrelationships of the varied macroscopic lesions. They decide that all the complex reactions of the tissues to the ova can be satisfactorily explained in terms of repair following trauma. Leukoplakia, found in 11% of the bladders, they consider to be a preneoplastic reaction of the epithelium. They could find no direct relationship between the quantitative presence of ova and the tissue reactions, and argue that the variations in reaction are probably a result of the state of the tissues involved at the time when a fresh deposition of ova occurs.

Until these differences in tissue reaction to schistosoma ova are better understood, the authors conclude that it is not possible to assess fully the role of the ova in the aetiology of carcinoma of bladder. Their study shows that it is not a direct relationship but that the evidence was not such that schistosomiasis could be excluded as an important aetiological factor. *J. R. Rose*

Ba, A., Camain, R. & Quenum, C. A propos d'une tumeur bilharzienne de la vulve. [**A Schistosomal Tumour of the Vulva**] *Bull. Soc. Méd. Afrique Noire Langue Française*. Dakar. 1959, v. 4, No. 4, 432–4.

The growth was a granuloma containing ova of *Schistosoma haematobium*.

Ross, W. F. **Clinical Trial of Bayer 2249 in Urinary Bilharziasis.** *Central African J. of Med.* 1960, Mar., v. 6, No. 3, 95–6.

Bayer 2249 (Schistocide) is "Tasteless Miracil" developed from lucanthone hydrochloride. For the latter drug considerable claims were originally made as

to its efficacy in *Schistosoma haematobium* (but not *S. mansoni*) infections [this *Bulletin*, 1949, v. 46, 556]. 57 patients, either children or young adults passing *S. haematobium* eggs in the urine were given 2249 orally in one or other of 2 dosages (60 mgm./kgm. or 75 mgm./kgm.) over 3 days. Urines were re-examined thereafter for 12 to 14 weeks, and miracidial hatching tests were done. "Cure" was assumed when there was absence of flame cell activity and of hatching 3 weeks and onwards after completion of the treatment. The cure rate ranged from 67% (12/18) upwards to 100% (12/12) in the 4 batches of patients treated. More gastric upset attended the treatment than that associated with lucanthone hydrochloride, and the taste of 2249 was as much disliked. The authors consider 2249 to be less therapeutically effective than, and at least as toxic as, the older drug; it proved just as unpalatable. *A. R. D. Adams*

POIRIER, A. & CARRÉ, J. Contribution à la connaissance de la bilharziose intestinale à *Schistosoma mansoni* à Madagascar. Étude épidémiologique du Foyer d'Ambositra. II. L'infestation humaine. [**Observations on Intestinal Schistosomiasis in Madagascar. Epidemiological Study of the Ambositra Focus. II. Human Infection**] *Bull. Soc. Path. Exot.* 1959, Nov.–Dec., v. 52, No. 6, 778–85.

Ambositra is a small township located in a river valley and surrounded by rice fields. The town's inhabitants are not exposed to risk of schistosomal infection; those of the surrounding areas are, by reason of their work. Mansonian schistosomiasis has been recognized among these since 1925. In the hospital in the township the number of cases identified has trebled during the last 9 years, probably owing to better diagnosis. Available figures of the incidence of schistosomiasis in the region are inadequate and indeed contradictory.

During a 2½-year period in the area the authors undertook a fresh study of the situation, basing it on stool examinations of the majority of adults and of children in villages and schools throughout the area. As expected, they found the incidence of infection to be far greater than previous reports suggested. Based solely on the identification of eggs in stools [? one specimen] it proved to be 54% to 59% in some of the communities studied. But these figures must be less than those of the true incidence of the infection; probably nearly all the inhabitants of the area in fact are infected. Such a high rate would account, wholly or as a contributory factor, for the majority of the many systemic disorders afflicting patients attending hospitals and clinics at Ambositra. This state of affairs is the more serious in view of the growth of the population and the extension of irrigation systems for rice cultivation; it must not be ignored.
A. R. D. Adams

KERSHAW, W. E., LEYTHAM, G. W. H. & DICKERSON, G. **The Effect of Schistosomiasis on Animal Intelligence.** *Ann. Trop. Med. & Parasit.* 1959, Dec., v. 53, No. 4, 504–6, 1 graph.

Two groups of laboratory rats (9 or 10 rats in each group) were exposed to infection with the cercariae of *Schistosoma mansoni*, the first group before the experiment and the second group during the course of the experiment, and the learning process as observed in each group was compared with that of a control group of uninfected rats. The experiment, with some slight variations, was repeated on two other occasions. The authors conclude:

"Low-grade infection with schistosomiasis retards the learning process, as assessed by the numbers of errors made by white rats in solving a 'T' maze. The effect is proportional to the intensity of infection, but the infection does not interfere with the recollection of what has already been learnt.

"The effect is indirect, and is not due to the presence of a parasite in the brain."

[This thoughtful paper suggests a new approach to the very old problem [this *Bulletin*, 1926, v. 23, 262] of how to obtain evidence for or against the popular belief that helminth infections have a deleterious effect on mental health.]

R. M. Gordon

CHING, Wei-Hsin, CHIEN, Shi-Ming, KUO, Cheng-Chi, CHCO, Chia-Hsiu & YEH, Chia-Fu. [**An Effective Regime for the Treatment of Schistosomiasis japonica with Tartar Emetic in Rabbits**] *Acta Pharmaceutica Sinica*. 1960, Mar., v. 8, No. 3, 126–30. [In Chinese.] English summary.

The authors, from the Chinese Academy of Medical Sciences, Wu-shi, designed an experiment, (i) to arrive at a large optimal initial dose of tartar emetic which would cause the adult schistosomes to shift from the mesenteric vessels towards the liver and (ii) to obtain an optimal maintenance dose which would prevent them from moving back.

Rabbits infected with 100 cercariae of *Schistosoma japonicum* were divided into 3 groups receiving 8 mgm./kgm. tartar emetic intravenously daily for 1, 2 and 3 days respectively. The hepatic shifts in these three groups were 74%, 93·5% and 98·0%.

The maintenance dose was calculated on the amount of the drug excreted in the urine and stool on the second day. Rabbits were then given either that amount or twice or three times the amount, and each of these three groups received the appropriate dose for 3, 5 and 7 days respectively.

"Comparatively satisfactory" results were obtained in groups receiving 8 mgm./kgm. for 2 days followed by a maintenance dose three times the amount excreted on the second day, given for 3 or 5 days.

H. J. O'D. Burke-Gaffney

TSEN, Yea-Lin. [**Studies on Antischistosomal Drugs. XXVI. Structure-Activity Studies on Rosaniline and its Combined Therapy with Tartar Emetic**] *Acta Pharmaceutica Sinica*. 1960, Mar., v. 8, No. 3, 134–40. [19 refs.] [In Chinese.] English summary.

GARCIA, E. Y. *Schistosoma philippinensis*, **New Species, and Pulmonary Schistosomiasis.** *J. Philippine Med. Ass.* 1960, Jan., v. 36, No. 1, 24–31, 10 figs.

During a short schistosomiasis survey of the Bagbag area of Victoria, Mindaro, the author observed that 80% of the inhabitants were suffering from clinical schistosomiasis and that "In a suitable number of them, we observed symptoms of distressing cough, hemoptysis, and much body wasting; in fact, we had the luck of finding the Schistosoma eggs in the sputum of one case with frank hemoptysis. This made him and others with the same symptoms, oddities from the ordinary schistosomiasis".

To explain these findings the author postulated that the adult worms had laid their eggs in the pulmonary vessels. To test this idea " Around 150 infected *quadrasi* snails (presumably) were crushed gently in an agate mortar ". Tap-water was then added and the released cercariae were applied in known numbers to the shaved abdomens of 7 laboratory rats. At the subsequent autopsies uniform lung changes were observed, which " . . . consisted of the finding of Schistosoma adults inside the pulmonary arterioles, outside the arterioles in the airsac tissue, in the bronchial lymph nodes, and the generalized pneumonitis associated with them ". An examination of the adult flukes recovered from the lungs showed that they differed from other species in that in the male the 7 testes showed a cluster arrangement, characters which the author considers are sufficient to distinguish them from the males of *S. japonicum*. On the strength of these findings Dr. Garcia proposes the name of *Schistosoma philippinensis* for what he considers to be a new species of fluke and the expression " schistosomiasis philippinensis " for what he believes to be a fresh clinical entity.

[Letters from two local parasitologists, addressed to the Editor and published in the same number of the journal (pp. 57–59), express the view that the evidence so far produced by Dr. Garcia is insufficient for the erection of a new species and the establishment of a new clinical entity.] *R. M. Gordon*

CHIZHOVA, T. P. & GOFMAN-KADOSHNIKOV, P. B. [**A Natural Focus of Diphyllobothriasis in the Baikal Lake and its Pattern**] *Med. Parasit. & Parasitic Dis.* Moscow. 1960, v. 29, No. 2, 168–76, 1 fig. [14 refs.] [In Russian.] English summary.

FAIN, A. & PIRAUX, A. Sparganose chez l'homme et les animaux au Ruanda-Urundi. [**Sparganosis in Man and Animals at Ruanda-Urundi**] *Bull. Soc. Path. Exot.* 1959, Nov.–Dec., v. 52, No. 6, 804–8, 1 fig. on pl. [11 refs.]

8 cases of sparganosis of man have so far been recorded from Africa, 3 of them from the warmer, humid west and 5 from the colder, drier, eastern plateaux [see SAMBON (*Proc. Zool. Soc.*, 1907, 282); also this *Bulletin*, 1944, v. 41, 301; 1947, v. 44, 1080 ; 1949, v. 46, 761 ; 1954, v. 51, 613 & 953 ; 1956, v. 53, 1024].

In the present paper the authors describe and illustrate a flattened, whitish sparganum 6·5 cm. long and 2·5 mm. broad, found in fluid in a swelling on the inner surface of the thigh of a man aged 35, at Ruhengeri in northern Ruanda-Urundi.

This is the fifth case found in the neighbourhood of the African great lakes and it suggests that a definitive host, doubtless one of the Canidae or Felidae, exists. *Diphyllobothrium mansoni* has not yet been found in Africa and the authors believe that all the plerocercoid larvae found in man in Central Africa probably belong to either *Diphyllobothrium theileri* or *D. pretoriensis*, and they give a list of the animals in which either the adults of these 2 species or undetermined spargana have been found in the Belgian Congo or Ruanda-Urundi, with references to the literature about them. The Canidae named in this list are the jackal (*Thos adustus*) and the Cape hunting dog (*Lycaon pictus*); the Felidae are the serval (*Felis serval*), the genet (*Genetta genetta*), the leopard (*Panthera pardus*) and the lion (*Panthera leo*) ; but spargana have now been

found, as the present paper records, in the monkey *Cercopithecus mitis doggetti* and the rodent *Lophuromys aquilus rita*, and Fain (*Rev. Zool. Bot. Africaines*, 1948, v. 41, 222) found one in the okapi (*Okapia johnstoni*). *G. Lapage*

Mamedov, M. M. [**On the Natural Foci of Alveolar Echinococcosis in the Turukhansk District of the Krasnoyarsk Territory**] *Med. Parasit. & Parasitic Dis.* Moscow. 1960, v. 29, No. 2, 157–61. [10 refs.] [In Russian.]

Angelillo, B., Corticelli, B. & Masia, G. F. La reazione di conglutinazione (C.C.A.T.) nella diagnosi di echinococcosi umana ed animale. [**The Conglutination Reaction in the Diagnosis of Human and Animal Echinococcosis**] *Igiene Moderna*. 1959, Sept.–Oct., v. 52, Nos. 9/10, 567–73. [20 refs.] English summary (7 lines).

The authors give particulars of the reagents and describe the techniques which they employed. They have applied the conglutination reaction to 229 human and 397 bovine sera: 13 of the human subjects were definitely known to be infected and the other 216 were tested as controls. The known positive bovines were 202 and their infection was demonstrated by post mortem examination.

The test confirmed the infection in 11 (84·6%) human beings and 127 (80·3%) animals. Among controls, a positive reaction was obtained from 23 (11·6%) human beings and 18 (10·9%) animals.

In known infected patients, the end titres of the reaction ranged from 1 in 16 to 1 in 128, while the titre at which 23 human controls gave a positive reaction went no higher than 1 in 20.

18 of the human sera and 74 of the bovine were found to have anti-complementary properties. *J. Cauchi*

Gonzalez, G., Centurion, C. A. & Rolon, P. A. Anquilostomosis. [**Ankylostomiasis**] *G.E.N.* Caracas. 1959, July–Dec., v. 14, Nos. 1/2, 17–40, 15 figs. [17 refs.]

The authors give a very full account of the epidemiology, clinical features and pathological anatomy of hookworm disease in Paraguay based on a study of 980 cases out of 14,476 patients seen between 1945 and 1957.

The disease affects up to nearly 90% of people in rural areas and accounts for a very high incapacity for work. It would appear to have been present in Paraguay before the Conquest. *Necator* predominates in the eastern part of the country and *Ancylostoma* in the Chaco area in the west: this is partly attributable to climatic and meteorological factors and the relative resistance of the species to adverse environmental conditions.

There were 844 patients with light infections, with little impairment of health and 136 suffering from overt hookworm disease of varying degrees of severity and complications. The authors describe 7 clinical syndromes, illustrating them with case records. These are (a) anaemic type of moderate disease (28%), (b) cardiovascular adaptation to anaemia (55%), (c) cardiac insufficiency from severe anaemia (18%), (d) severe oedema (23%), (e) endocrine defects, (f) " neuro-anaemic " syndrome, (g) such pathological associations as arteriosclerosis, thrombosis and haemorrhagic complications.

The intestinal manifestations in the severer forms of ankylostomiasis are discussed at some length. The symptoms in the most severe cases are associated with a severe jejunoileitis, with oedema, haemorrhage, erosion and ulceration. There is a full account of the pathological anatomy and this is illustrated by 15 clear photomicrographs which show the inflammatory and other changes in the villi.

Finally there is a short discussion on the metabolism of iron, with special reference to defective absorption and its relation to response or resistance to treatment. *H. J. O'D. Burke-Gaffney*

MATSUMOTO, T. [**An Experimental Study of the Anaemic Factor of Hookworms. Part I. Simplified Media for Culture of Hookworms**] *J. Osaka City Med. Center.* 1959, May, v. 8, No. 5, 618–26. [15 refs.] **Part II. Anaemic Factor of Hookworms released in Cultured Media**] *Ibid.*, 627–45, 14 charts. [24 refs.] [In Japanese.] English summaries.

I. In this brief English summary the author describes experiments in which adult hookworms from spontaneously infected dogs were placed in test-tubes containing 2 cc. each of various solutions. These were incubated at 37°C. and observed every hour for survival. Absence of spontaneous movement or activity in the presence of heat was taken to indicate death of the worms.

The media used consisted of water, glucose, polypeptone, polytamine and some 20 amino-acids. The results were as follows:

water (well, distilled and pond)	less than	12	hours' survival
2 to 5% glucose or polypeptone	up to	18	„ „
3 to 4% polytamine	„	24	„ „
1 to 3% amino-acids	„	48	„ „

In the case of amino-acids, those which were difficult to dissolve in water did not produce the long survival. The best were glycine, alanine, threonine, valine, arginine, glutamic acid, histidine and hydroxyproline. The concentration was important, owing to the influence of osmotic pressure: too concentrated a medium caused shrinkage of the worm and dilution caused inflation.

The advantage of an amino-acid solution in metabolic studies of hookworm is stressed. 25 tables in the Japanese text give details of the experiments and concentrations of amino-acids used.

II. 500 hookworms from dogs were cultivated in 0·6% glycine, 1·25% arginine or 1·25% histidine solutions for 8 hours at 37°C. Control media without worms were also used: both media were injected subcutaneously into rabbits, and haemoglobin and red cell counts were made for 5 days. Anaemia was conspicuous in rabbits injected with cultured medium but not with control medium. It was still distinct even if the cultured medium was heated at 100°C. for 30 minutes before injection or if a residue obtained after dehydration by heat and dissolved in water was injected. If the cultured medium was distilled at 100°C., anaemia was induced only by the non-distilled portion. The anaemic factor in the cultured medium was soluble in ether, alcohol and acetone.

The anaemic factor from hookworms which is released in amino-acid culture media is evidently heat stable. A negative result with paper chromatography suggests that the anaemic factor is not a free fatty acid, but a more complicated lipid. *H. J. O'D. Burke-Gaffney*

ROHDE, K. Vergleichende Untersuchungen über die Hakenwürmer des Hundes und der Katze und Betrachtungen über ihre Phylogenie. [**Comparative Studies on Hookworm in Dogs and Cats and Observations on their Phylogeny**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1959, Dec., v. 10, No. 4, 402–26, 7 figs. [Numerous refs.]

BASNUEVO, J. G., JORDÁN RODRÍGUEZ, J., BORBOLLA, Liane, CASANOVA, R. & ALVAREZ FLORES, R. Tratamiento de la strongyloidiasis con ditiazanina. [**Therapy of Strongyloidiasis with Dithiazanine**] *Rev. Kuba Med. Trop. y Parasit.* 1959, Jan.–June, v. 15, Nos. 1/6, 5–8, 3 figs.

The English summary appended to the paper is as follows: —

"An effective therapeutic agent in the treatment of the Strongyloidiasis is Dithiazanine (3,3'-diethylthiadicarbocyanine iodide). Of 15 patients treated (4 adults and 11 children), the infection of Strongyloides was eliminated in all cases (100%). The treatment included six F2AM serial analyses of the excrement (one every 5 days) and a bile analysis after the treatment. The Dithiazanine was administered at a dosage of 600 mg. daily, for 10 days, to adults and 10 mg. per pound of body weight, daily, for 10 days, to children with less than 60 pounds of body weight. Children weighing more than 60 pounds were given the same dosage as adults.

"Vomits were stopped by administering Promazine Hydrochloride at a dose of 0·5 mg. to 1 mg. per pound of body weight, daily. In none of the cases was it necessary to stop the antiparasitic treatment.

"Dithiazanine is the best of all medical products used at the present time for the treatment of Strongyloidiasis."

NAGATY, H. F., RIFAAT, M. A. & MORSY, T. A. **The Latex of** *Calotropis procera* **(Family: Asclepiadeceae), a New Substance having an Ascaricidal Effect** *in vitro*. *J. Egyptian Med. Ass.* 1959, v. 42, No. 10, 563–6.

The authors review previous investigations which have demonstrated the ascaricidal action of the sap of trees of the Ficus and Moraceae families [this *Bulletin*, 1960, v. 57, 58]. Of these the latices of *Ficus carica* and *Ficus glabrata* were the most potent: their action appeared to be enzymatic since they digested gelatin and could digest whole *Ascaris* worms even in concentrations as low as 0·15%, within a period of 2 hours.

The latex from a tree of the Asclepiadeceae family, *Calotropis procera*, growing in upper Egypt, was tested for its lethal action on pig and bovine *Ascaris* worms *in vitro*. It was shown that a 1·2% solution in tap water would kill and completely digest the worms within 2 hours at 37°C. Similar worms kept in Ringer's solution for 2 hours at the same temperature were undamaged.

Acute toxicity tests of the latex on white rats showed no effects at a dosage of 6 ml./kgm. body weight.

[No claim for its clinical effectiveness has yet been made.] *J. H. Walters*

STRANSKY, E. & FELARCA, Allison B. **The First Case of Visceral Larva Migrans observed and diagnosed in the Philippines.** *J. Philippine Med. Ass.* 1960, Feb., v. 36, No. 2, 98–102. [27 refs.]

The patient was a child aged 2 years.

McCarthy, D. D. **Filariasis in the Cook Islands.** *New Zealand Med. J.* 1959, Dec., v. 58, No. 328, 738–48, 1 fig. [12 refs.]

The Cook Group consisting of some 15 islands with a total land area of less than 100 square miles and a total population of less than 17,000 people is scattered over more than 850,000 square miles of South Pacific Ocean. During the past 35 years several series of blood examinations have been made over this vast area, mainly in the Southern Group of islands and, as might be expected from so wide a scatter of surveys, the results obtained show considerable variation, probably due, in a large part, to the difference in age composition of the samples.

During the present survey 20 cmm. of blood was collected from each person and the total number of microfilariae in this amount of blood was noted. In each case the name, sex, age and locality of the person were recorded.

The results obtained are presented in a very clear and interesting manner. In order to get over the difficulty of rendering comparable samples taken from populations containing varying proportions of age-groups, the author has reduced the age-group incidence to a "Standard Population", the standard population being taken as 100 persons in whom the age-groups are represented in the same proportion as they occur in the general population. "When the age group incidence is reduced to a Standard Population it has been termed the standard incidence, while the average microfilarial density per unit of the standard population has been called the Reservoir Index." The filarial prevalence in the various islands composing the Cook Group are demonstrated in numerical and in graphic form as shown by these different blood indices.

The author's summary is as follows:—

"Filariasis is hyperendemic in the islands of Aitutaki and Atiu and of moderate endemicity in Rarotonga.

"The degree of endemicity varies considerably in the various districts of Rarotonga, Arorangi and Takitimu districts being the most heavily infected.

"Of the atolls, Penrhyn and Rakahanga have degrees of endemicity which are below the level required for the production of clinical filariasis.

"Manihiki which originally was probably of the same endemic rating as Rakahanga has through infected immigrants and poor hygiene raised its rating to one of moderate severity.

"Pukapuka, although the most isolated of the atolls, has a moderate degree of endemicity with elephantiasis and allied clinical conditions appearing in early middle age in males and late middle age in females."

R. M. Gordon

McCarthy, D. D. **The Endemicity of Filariasis in the Pacific Island Dependencies of New Zealand.** *New Zealand Med. J.* 1959, Dec., v. 58, No. 328, 757–65, 4 figs. [13 refs.]

The author discusses—among other aspects of filariasis in the Cook Islands—the interesting finding that although high microfilarial counts are more common in areas of high endemicity than in those of low endemicity where occasional cases of elephantiasis and hydrocele occur, nevertheless their distribution does not conform to the age-group density curve and high counts are to be found at all ages. High rates of infection and re-infection appear to be related to occupations and activities which take the person into the vector habitat, which

in the case of the principal vector *Aëdes polynesiensis* is in the bush and in the coconut plantations, as distinct from the village environment. "The entry by man into the vector habitat is primarily occupational in the case of adult males, perhaps in the case of a few females, and recreational in the case of children and adolescents, particularly boys. This could explain the higher degree of microfilaraemia in adolescent and adult males. The individual activities of some female children and adults may explain the high infestation found in some individuals of a group whose attachment to the domestic environment keeps its general infectivity low. . . .

"It has not yet been possible to make a complete study of individual activities in relation to time spent in differing localities but it is possible that such may have some importance as a factor in the epidemiology of filariasis in these islands and particularly in regard to the occasional cases of elephantiasis and hydrocele which are found among groups whose general low level of endemicity would appear to preclude the presence of major clinical filariasis."

R. M. Gordon

UTTLEY, K. H. **The Mortality and Epidemiology of Filariasis over the Last Hundred Years in Antigua, British West Indies; including a Comparison with Available Data from Elsewhere in the West Indies.** *West Indian Med. J.* 1959, Dec., v. 8, No. 4, 238–48. [34 refs.]

The population of Antigua is about 55,000, one-fifth of whom are resident in St. John's, the only town in the island. The remainder live in fairly compact villages of 200 to 1,500 persons.

During the past century 357 deaths from elephantiasis have been recorded, but the severe form of the disease has apparently diminished considerably in recent years. There were 20 deaths among the white population, which is approximately what would be expected from the ratio of white to coloured subjects in the island.

A summary is given of available data regarding the epidemiology of filariasis in the Caribbean area. *Wuchereria bancrofti* is the nematode most frequently encountered and is by far the greatest cause of filarial morbidity. *Mansonella ozzardi* has also been recorded in certain territories. The mosquito vector in Antigua, as in most of the Caribbean, is *Culex fatigans*.

A table compares the death rate from filariasis in Antigua, St. Kitts and British Guiana from 1918 to 1957.

G. Covell

ERA, E. [**Experimental Studies on the Periodicity of Microfilariae**] *Endem. Dis. Bull. Nagasaki Univ.* 1959, Sept. 23, v. 1, No. 3, 252–77, 4 figs. & 12 charts. [88 refs.] [In Japanese.] English summary.

According to the English summary of this Japanese paper the author discusses the well known theories of microfilarial periodicity and then describes his own experiments. In the case of *Wuchereria bancrofti*, the microfilariae in the blood during the day averaged 2% (0–6·5%) of those present at night (maximum between 24.00 and 2.00 hours). With *Dirofilaria immitis* the microfilariae by day averaged 37% (23–48%) of those at night, the maximum occurring between 20.00 and 22.00 hours.

When adult worms of *D. immitis* were transferred by intravenous cannula to fresh dogs, 11 of 16 male and 6 of 18 female worms survived, suggesting that

male worms live longer than females. [Much would depend on the techniques of handling; in general male worms are more resistant to drugs than females.] In 6 dogs which received 1–4 female worms, the maximum number of microfilariae (4,000 to 730, volume of blood unstated) was reached after 56 to 172 days. In 3 dogs, the daily habits of sleep were reversed by forced exercise for 9 hours each night so that they slept by day. After 7 days the peak of the microfilaria count was changed so that it came between 8.00 and 14.00 hours.

Similarly, in a man with *W. bancrofti* whose hours of sleep and activity were reversed, after 9 days the peak was shifted to 6 hours later than before. Observations were also made on a miner working underground from 8.00 to 16.00 hours for 3 months; on 2 men who were kept similarly underground from 6.00 to 18.00 hours for 3 weeks; on 2 persons with total blindness and 2 men who were experimentally blindfolded with lead discs during 3 weeks. In all these the interception of sunlight had no significant influence upon the nocturnal periodicity of *W. bancrofti.*

2 dogs infected with *D. immitis* were blinded but there was little change in the microfilarial periodicity.

It is concluded that the nocturnal periodicity of [these] microfilariae is due to the habits of the host—working by day and sleeping at night. [This has long been accepted: the problem which remains to be solved is: how do the microfilariae know what are the general habits of the host—not just the activity or sleepiness at any particular moment?] *F. Hawking*

See also p. 778, Liu *et al.* [**One Year's Observations on the Development and Habits of *A. sinensis* and *C. fatigans* in Foochow**]

Friedheim, E. A. H. & De Jongh, R. T. L'effet du pentylthiarsaphénylmélamine (Mel W) sur *W. bancrofti*. [**The effect of Pentylthiarsaphenylmelamine (Mel W) on *W. bancrofti***]. *Bull. Soc. Path. Exot.* 1959, Nov.–Dec., v. 52, No. 6, 785–91, 1 fig.

Mel W is a water soluble form of Mel B and it has been introduced originally for the treatment of human trypanosomiasis [this *Bulletin,* 1959, v. 56, 1115]. In Egypt 3 people with a low microfilaraemia have been treated with 0·1 gm. Mel W injected intramuscularly on 4 successive days. The first man, aged 53, had a subcutaneous nodule the size of a haricot bean in his right groin. His microfilaria rate was 0 to 2 per 0·1 cm.^{3} (presumably at night). 4 days after treatment the nodule swelled up, temperature rose to 38°C. and there was a morbilliform pruriginous erythema on his chest and calves. These symptoms disappeared in 4 days. He was then given 0·15, 0·2 and 0·2 gm. on successive days without any reaction. 12 days after the first treatment the nodule was excised and it was found to contain 3 dead adult worms. The microfilarial count was too low throughout to show any significant changes.

The second man, aged 22 years, had a painful swelling of the spermatic cord, epididymis and right testicle about 5 days after the end of treatment, and this swelling lasted 4 days, after which it subsided.

The third patient, aged 14, had no clinical reaction to treatment. In all 3 cases there was a tendency for the microfilarial count to rise a few days after treatment and then to return to its previous level.

2 other patients with high microfilaraemia were treated in Liberia. In one (4th patient) there was a marked oedema of scrotum and its contents 7 days after treatment (0·2 gm. on 3 consecutive days); the microfilaraemia initially about 180 microfilariae per 20 mm.^{3} fell in 2 weeks to 3 microfilariae and it gradually disappeared by the 13th week.

The other patient showed a similar history, although the microfilaraemia only fell to 24% of its original value within 2 months of treatment. These results are interpreted as meaning that the adult worms (or some of them) have been killed by the treatment.

[Other trivalent arsenicals, *e.g.* arsenamide, are known to kill the adult worms although there is a danger of toxic effects (or even massive necrosis) in the liver in patients who have an idiosyncrasy [McFadzean and Hawking, *ibid.*, 1954, v. 51, 708]; it will require further work to show whether Mel W is more effective, safer or more convenient than arsenamide. The limitation to a 3–4-day course and the intramuscular injection would certainly constitute great advantages.]

F. Hawking

Pieters, G. & Le Maire, W. Cure d'éléphantiasis pénien. Procédé de la cravate. **[The "Cravat Procedure" in Treatment of Penile Elephantiasis]** *Ann. Soc. Belge de Méd. Trop.* 1959, Oct. 31, v. 39, No. 5, 781–3, 1 fig.

Another method of operative cure for penile elephantiasis is here described. The authors present it briefly as an alternative to the method of Linard [this *Bulletin*, 1959, v. 56, 1265]. The reasons given for doing so are that there are certain cases where the Linard method is inapplicable, namely: where elephantoid infiltration has extended too widely; where previous operative cure of a scrotal elephantiasis has left the area unsuitable for the tunnel manoeuvre; where the penis itself is too short for insertion into a tunnel.

It is for these cases that the authors have used their method which they designate "the cravat procedure". They give an admirably brief description of it as follows:—

(1) Scrubbing with soap and water the penis and selected thigh, application of a quaternary ammonium antiseptic.
(2) Resection of the elephantoid tissue from the penis to a line just proximal to the corona ensuring haemostasis.
(3) Dissection of a band of skin 2½–3 cm. wide on the thigh, commencing about two fingerwidths below the inguinal ligament and extending down for 20–25 cm., freeing the lower end and scraping off the excess fat from the strip thus raised which now has the upper end as its pedicle. Closure of the thigh wound in two layers.
(4) Coiling the skin flap around the bare penis, starting at the base and continuing to the corona, with fixation in a few places with nylon sutures and fashioning the end to fit coronal skin margin.
(5) Protection and fixation of the penis and the pedicle by the use of a dressing with balsam of Peru. Insertion of a catheter for a few days.
(6) Antibiotics. Renewal of the dressings after 5–6 days. Section of the pedicle after 15–20 days.

The advantages claimed for this method are that, in addition to it providing a scar-free and functional penis, it is simple and practically completed at one operation.

J. R. Rose

NAIR, C. P., KRISHNAN, K. S. & ROY, R. G. **Filariasis in Kerala State. Part V. Filaria Survey of Edapally Panchayat (Ernakulam District).** *Indian J. Malariology*. 1959, June–Sept., v. 13, Nos. 2/3, 117–23, 1 map.

An account is given of a filaria survey carried out in January–February 1957 in Edapally Panchayat, Southern India, which has a population of 12,393, in the course of which 631 persons were examined. The microfilarial, filarial disease and endemicity rates for the area were found to be 11·7, 10·4 and 22·1% respectively. The average infection was 12·7 per positive smear of 20 cmm. of blood. The predominant infection was with *Wuchereria malayi,* and the mosquito vector incriminated was *Mansonia annulifera*, with an infection rate of 12·9% and an infectivity rate of 3·2%.

The incidence of filariasis in the area surveyed has apparently not altered in any marked degree during the past 25 years [this *Bulletin*, 1939, v. 36, 148]. No control measures have been in force during this period. *G. Covell*

BUCKLEY, J. J. C. **On *Brugia* gen. nov. for *Wuchereria* spp. of the "*malayi*" Group. i.e. *W. malayi* (Brug, 1927), *W. pahangi* Buckley and Edeson, 1956, and *W. patei* Buckley, Nelson and Heisch, 1958.** *Ann. Trop. Med. & Parasit.* 1960, Apr., v. 54, No. 1, 75–7, 1 fig.

"The experimental transmission of *Wuchereria malayi* from man to cats by EDESON and WHARTON [see this *Bulletin*, 1958, v. 55, 196] in Malaya made it possible to recover and study the anatomy of many adult worms of the species, which previously had been inadequately described, having been recovered on only two occasions, both from human sources, by RAO and MAPLESTONE [see *ibid.*, 1941, v. 38, 152] and by BONNE *et al.* [see *ibid.*, 1942, v. 39, 184] respectively.

"In 1956, BUCKLEY and EDESON [see *ibid.*, 1956, v. 53, 1156] found and described another species, different from *W. malayi,* which occurred in the lymphatics of domestic and wild animals in the Pahang State of Malaya; they named it *W. pahangi*. In 1958, BUCKLEY, NELSON and HEISCH [see *ibid.*, 1958, v. 55, 1262] described a third species, from the lymphatics of cats, dogs and genet cats on Pate Island, Kenya, and named it *W. patei*. These three species, both in the adult and in the microfilarial stage, comprise a distinct group, the members of which are closely allied to one another yet differ constantly from *W. bancrofti* in certain characters. It is proposed, therefore, to remove them from the genus *Wuchereria* and to place them in a separate genus, to be named *Brugia* in honour of the discoverer of *Microfilaria malayi*. The morphological features that characterize the new genus and differentiate it from *Wuchereria* are:—

"1. The microfilariae of *Brugia malayi, B. pahangi* and *B. patei* are all alike, and it is difficult to differentiate them. All three are quite distinct morphologically from the microfilaria of *W. bancrofti*.

"2. The left spicule in the three species of *Brugia* is characterized by a rather complex centre section. In *Wuchereria* it is a simple structure.

"3. The caudal papillae in the three species of *Brugia* are relatively few in number. In the anal region there is typically a total of 11, comprising four pairs of ventro-laterals, two post-anals and one large pre-anal papilla. Atypically there may be five or three ventro-lateral papillae on either side. In *Wuchereria*

the anal papillae number about 24, consisting of 9–12 ventro-laterals on each side, two post-anals and one pre-anal papilla. In addition to the group of anal papillae, there are situated between them and the tip of the tail, and somewhat variable in position and number, two papillae (typically) in *Brugia* and about four in *Wuchereria*.

"4. The three species of *Brugia* are relatively small in size. The maximum length of a female is about 60 mm. and the maximum width 190μ; males attain about 25 mm. in length and are less than 100μ in width. In *W. bancrofti* the female may attain 100 mm. in length and 300μ in width; males are up to 40 mm. long and about 190μ wide."

The new genus *Brugia* is formally defined. The taxonomical designations and morphological features are shown in an illustration. *W. E. Kershaw*

BURTON, G. J. **Studies on the Bionomics of Mosquito Vectors which transmit Filariasis in India. I. Attachment of *Mansonia annulifera* and *Mansonia uniformis* Larvae to Host Plants occurring in *Pistia* Tanks in Kerala, South India.** *Indian J. Malariology*. 1959, June–Sept., v. 13, Nos. 2/3, 75–115, 54 figs. on 26 pls.

Larvae of *Mansonia annulifera* will attach themselves to the roots of *Pistia stratiotes, Eichhornia speciosa, Bacopa monnieri, Commelina salicifolia, Trapa bispinosa, Marsilea quadrifoliata* and *Limnophila gratioloides*, and to the leaves of *Pistia, Azolla pinnata, Lemna minor, Limnophila, Nelumbo nucifera* and *Nymphaea* species. All the plants are found in tanks and ponds in Kerala State. *Colocasia antiquorum*, which grows in similar places, was not a suitable host plant for the larvae. Larvae of *M. uniformis* and *M. annulifera* showed no preference for *Pistia* or *Eichhornia* when both these plants were available together.

Fourth instar larvae of *M. annulifera* in water from the breeding places, but without host plants, all died within 60 hours, 32% surviving for 24 hours under these conditions. Observations on the attachment of the larvae to the host plants are given in detail. [See also this *Bulletin*, 1958, v. 55, 1260; 1959, v. 56, 469.] *B. R. Laurence*

HSIEH, Shu-Chen, LIU, Yü-K'un & LIU, J. **Single Dose Hetrazan Treatment of Filariasis.** *Chinese Med. J.* Peking. 1960, Feb., v. 80, No. 2, 166–9.

The authors recall that two recent experiments on the treatment of *Wuchereria bancrofti* and *W. malayi* infections by diethylcarbamazine in single doses gave conflicting results. Thus in Fukien a satisfactory clearance rate of 90% was obtained, but in Shantung identical treatment was successful in only 32·6% of patients [this *Bulletin*, 1959, v. 56, 861]. They therefore carried out a much larger field trial in two districts near Shanghai, the results of which are recorded in this paper.

In Paoshan, where 122,252 people were examined, 1,630 (1·33%) were positive, microfilariae of *W. bancrofti* being found in every case. The microfilarial counts were 1–5 per 40 cmm. blood in 84·6%, the highest count being 112. In a group of 4 villages in Ch'ingp'u the incidence of infection was 4·13% and all infections were with *W. malayi*. Microfilarial counts were higher, ranging from 1–151 per 40 cmm. of blood, 47·4% being below 5.

The patients were assembled in improvised wards for treatment. Each adult was given 1 gm. of diethylcarbamazine, and each child a dose calculated as 20 mgm. per kgm. body weight: the drug was administered in the late evening.

The results were assessed 24–36 hours after treatment and again 6 weeks later. [No longer term follow-up examinations were made.] In those infected with *W. malayi* who showed 1–5 microfilariae per 40 cmm. 89·6% were cleared immediately, but only 73·6% of those with over 10 microfilariae per 40 cmm. became negative, though there was a 92·3% reduction in microfilarial density in those in whom clearance was incomplete. Similar immediate clearance rates in *W. bancrofti* infections were lower, being 69% and 33·3% respectively, with an 80% reduction in microfilaraemia in those who remained positive. Better results emerged at the 6 weeks' follow-up examination however, the 69% clearance rate in light infections increasing to 84·6% and for heavy infections the figure improving from 36·8 to 89%.

The reactions to this single dose therapy were common and were both more frequent and more severe in the case of *W. malayi* infections than in those due to *W. bancrofti*. The manifestations, with their respective incidences in the two types of infection were: fever, 86% and 28%, itching, 1·4% and 4·3%, nausea and vomiting, 39·3% and 21·5%, dizziness and headache, 53·6% and 58·2%. Fever might reach 41°C. and persist for 5 days, though the usual duration was 2–3 days. Local reactions were frequently noted, comprising erysipeloid inflammation of the inguinal region and thighs in *W. malayi* infections, and the appearance of painless nodules in the scrotal skin in infection with *W. bancrofti*. As has often been reported before, treatment often caused the evacuation of *Ascaris* worms and led to partial intestinal obstruction with aggregations of dead worms in 2 instances.

[The results of this massive field trial would appear to justify the use of the single dose diethylcarbamazine treatment as a mass control measure, despite the troublesome side effects. It cannot be accepted as ideal however unless follow-up examinations at 1 and 2 years proved that all microfilaria production had ceased. McGregor and Gilles [this *Bulletin*, 1956, v. 53, 638] showed that this returned in many seemingly cured patients, apparently owing to the survival of developing filarial worms whose immature reproductive organs had remained unaffected by the drug.] *J. H. Walters*

See also p. 794, Williams, **The Effect of Atmospheric Pressure on *Aëdes aegypti* exposed to *Dirofilaria immitis* and on *Glossina morsitans* exposed to *Trypanosoma rhodesiense* or *T. congolense*.**

Pistey, W. R. **Studies on the Mortality of Mosquitoes infected with *Dirofilaria tenuis* Chandler 1942.** *Exper. Parasit.* New York. 1959, Dec., v. 8, No. 6, 596–608, 8 figs. [18 refs.]

See this *Bulletin*, 1954, v. 51, 83 ; 1958, v. 55, 673 ; 1960, v. 57, 739.

Scott, D. **An Epidemiological Note on Guinea-Worm Infection in North-West Ashanti, Ghana.** *Ann. Trop. Med. & Parasit.* 1960, Apr., v. 54, No. 1, 32–43, 5 figs.

Two series of dracontiasis surveys were conducted during the period 1952–58 in the Mo district of north-west Ashanti, which has an area of 250 square miles

and a population of 4,000. In the first series annual surveys were made throughout the district during the month of May in 1952, 1953 and 1954; in the second, monthly surveys were made from December 1957 to December 1958 in 3 villages with a total population of 938. Dracontiasis is an important health problem, the incidence being as high as 40% in some parts of the district.

Climate appears to be the greatest single factor in determining the natural distribution of the disease. Where long dry seasons are experienced, communities may have to depend for their water supply on shallow ponds, which are particularly dangerous; conversely, where running water is available for domestic use, the disease is kept in check, even in areas where the standard of hygiene is otherwise relatively low. The effect of a definite dry season together with an incubation of the infection of about 12 months duration, results in a marked annual variation in incidence, the prevalence being greatest at the end of the dry season and least in the mid-rains.

In the area investigated, about one-quarter of the population were found to be infected in the course of a year, the attack rate being highest in adult females and lowest in girls. More than half the population are infected before the age of 10; thereafter new infections occur with diminishing frequency and about one-quarter of the people appear to be completely resistant.

Variations in individual susceptibility are attributed to differing degrees of gastric acidity, those who show a relatively high acidity 2 hours or more after a fractional test meal being largely protected from infection. It is suggested that this is brought about through destruction of the guinea-worm larvae by prolonged high acid concentration after they escape from the cyclops.

G. Covell

MORISHITA, K. & TANI, T. **A Case of *Capillaria* Infection causing Cutaneous Creeping Eruption in Man.** *J. Parasitology*. 1960, Feb., v. 46, No. 1, 79–83, 5 figs. on pl. [45 refs.]

Two female ovigerous nematodes belonging to the genus *Capillaria* were extracted, one of them from the finger and the other from the ankle, of a Japanese adult male. In both instances the presence of the worms had caused a typical cutaneous creeping eruption. The parasite resembles in morphology *C. cutanea*, which is known to cause subcutaneous nodules, oedema and blisters in its monkey host, but the present authors prefer to forgo the specific determination of the worms found by them until males of the same species become available.

R. M. Gordon

BASNUEVO, J. G., JORDÁN RODRÍGUEZ, J., BORGES, F., BORBOLLA, Liane, CASANOVA, R., ALVAREZ FLORES, R. & VÁZQUEZ PÉREZ, E. Tratamiento de la tricocefaliasis con ditiazanina. **[Treatment of Trichuriasis with Dithiazanine]** *Rev. Kuba Med. Trop. y Parasit.* 1959, Jan.–June, v. 15, Nos. 1/6, 15–18.

The English summary appended to the paper is as follows:—

"Out of 32 cases of Trichuriasis treated with Dithiazanine 20 (62·5%) were cured, and 12 (37·5%) were not.

"Adults received 600 mg. of Dithiazanine, daily for 10 days. Children weighing less than 60 pounds received 10 mg. of Dithiazanine per pound of body weight, daily, for 10 days.

" Adults and older children were administered a treatment in the form of tablets with enteric covering. Children weighing less than 30 pounds were administered the treatment in the form of sugared granulate, each gram of granulate containing 10 mg. of Dithiazanine.

" The cases not cured with Dithiazanine were afterwards treated with enemas of colloidal Hexylresorcinol (Santokín) at 1 x 300 carried up to the cecum."

TRAWINSKI, A. **New Method of Testing Meat for the Presence of Larvae of Trichina by the Flocculation Reaction in Gel.** *Bull. Acad. Polonaise des Sci.* Warsaw. Sér. Sci. Biol. 1960, v. 8, No. 1, 41–3, 2 figs.

The author reviews some of the methods now in use for recognizing the presence of the larvae of *Trichinella spiralis* in meat, and describes his own technique for a mass flocculation reaction in gel. " By this method one hour suffices for examining about 80 pigs, the time of blood drawing included, using a very small amount of trichina antigen." [No mention is made of the sensitivity of the test.] *R. M. Gordon*

ROBIN, E. D., CRUMP, C. H. & WAGMAN, R. J. **Low Sedimentation Rate, Hypofibrinogenemia and Restrictive Pseudo-Obstructive Pulmonary Disease associated with Trichinosis.** *New England J. of Med.* 1960, Apr. 14, v. 262, No. 15, 758–61. [14 refs.]

Discussion and report of a case.

DEFICIENCY DISEASES

See also p. 860, EAST AFRICA HIGH COMMISSION. **East African Institute for Medical Research Report, 1958–1959.**

ARROYAVE, G., SCRIMSHAW, N. S., PINEDA, O. & GUZMÁN, M. A. **Electrophoretic Pattern of Hyperproteinemic Sera in a Population Group of Rural Panama.** *Amer. J. Trop. Med. & Hyg.* 1960, Jan., v. 9, No. 1, 81–4, 1 fig. [15 refs.]

The serum protein levels of 98 adult inhabitants of a village in Panama were measured. Total protein varied from 6·45 to 8·72 gm./100 ml. The values for the first, second and third quartiles were 7·24, 7·52 and 7·90 respectively. These values are higher than the usually accepted standards of normality. Electrophoretic studies indicated that the albumin, alpha$_1$, alpha$_2$, beta and gamma globulin fractions all contributed to the elevated totals. This is in contrast to other studies in the tropics where elevated levels of gamma globulin have been held responsible for high total proteins [this *Bulletin*, 1951, v. 48, 827; 1955, v. 52, 74, 75; 1956, v. 53, 230]. *R. Passmore*

HELLYER, G. C. & WENT, L. N. **Serial Electrophoretic Studies on the Serum Proteins of Malnourished Jamaican Infants during Treatment.** *J. Trop. Pediatrics.* London. 1960, Mar., v. 5, No. 4, 109–14, 3 figs. [20 refs.]

The serum protein concentrations of groups of Jamaican infants are reported. The albumin fraction was markedly low in the malnourished group and rose rapidly after treatment. Levels of beta and gamma globulin were also slightly lower in the malnourished than in the normal group. *R. Passmore*

FUHRMANN, G. Neuere Arbeiten über das Kwashiorkor-Syndrom. [**Recent Work on Kwashiorkor**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1959, Dec., v. 10, No. 4, 477–97. [175 refs.]

A review.

DIAMOND, I. & VALLBONA, C. **Kwashiorkor in a North American White Male.** *Pediatrics.* Springfield, Ill. 1960, Feb., v. 25, No. 2, 248–57, 7 figs. [10 refs.]

The typical clinical and pathological changes of kwashiorkor are described in an 11-year-old white boy who died of the disease. The boy came from a family of rural slum dwellers, living in a remote part of Kentucky, and this account is a useful reminder that poverty can still cause serious illness, even in the prosperous United States. The clinical history is unusual in that after a period of 39 days in hospital he improved greatly and went home apparently robust. He relapsed 10 months and again 7 months later and on each occasion was readmitted. He died after 2 days on the last occasion, markedly emaciated and with severe oedema. *R. Passmore*

HANSEN, J. D. L., SCHENDEL, H. E., WILKINS, J. A. & BROCK, J. F. **Nitrogen Metabolism in Children with Kwashiorkor receiving Milk and Vegetable Diets.** *Pediatrics.* Springfield, Ill. 1960, Feb., v. 25, No. 2, 258–82, 8 figs. [44 refs.]

It is now well established that milk protein is the most effective dietary treatment for kwashiorkor, but in many circumstances this may be unprocurable or too expensive—especially where large numbers of children are affected. The assessment of the therapeutic value of other dietary proteins is an important problem. In this paper the Cape Town workers give a long account of careful metabolic studies on 43 children admitted to hospital. [It is not possible to do justice to all the accurate work here reported in an abstract and the paper can be recommended to all serious students of the disease.]

As objective measures of clinical progress 3 criteria have been used—the degree of nitrogen retention from the diet, the gain in body weight and serial estimations of the serum albumin. Maize meal alone is generally of limited therapeutic value, but if supported by a little milk or egg protein or by maize germ or cow-pea meal excellent therapeutic effects are sometimes obtained. Though the vegetable mixtures tested have not proved as efficient sources of protein as milk, the results have been encouraging and warrant further study for improved mixtures—especially for preventive measures.

[See also this *Bulletin*, 1957, v. 54, 334, 470.] *R. Passmore*

BRESSANI, R., WILSON, Dorothy L., BÉHAR, M. & SCRIMSHAW, N. S. **Supplementation of Cereal Proteins with Amino Acids. III. Effect of Amino Acid Supplementation of Wheat Flour as Measured by Nitrogen Retention of Young Children.** *J. Nutrition.* 1960, Feb., v. 70, No. 2, 176–86, 1 fig. [15 refs.]

The third paper in this series [for abstracts of previous papers see this *Bulletin*, 1959, v. 56, 967] describes experiments in which nitrogen balances were measured in 6 young children, all convalescent from severe protein malnutrition. Through the experiments the children were kept on a basal diet in which all the nitrogen was provided by wheat protein or glycine. Various amino-acids or mixtures of amino-acids were substituted for part of the glycine and corn starch in the diet, but these modifications were adjusted so that both the nitrogen content and the caloric content of the diets remained constant for each child. As judged by the gains in weight reported, all the children remained well throughout the trial.

The addition of lysine to the diet in all instances increased nitrogen retention. Thus the low lysine content of wheat protein was shown to be a factor which limited the ability of wheat to promote growth in these children: this confirms the observation of several other workers using young rats. In some trials, the addition of tryptophan further increased the effect of lysine. The addition of methionine, threonine, isoleucine and valine did not lead to significant changes in nitrogen retention.

These findings are discussed in relation to the amino-acid composition of the hypothetical "reference protein" described by FAO [*ibid.*, 1958, v. 55, 1267]; analyses of the amino-acids in wheat protein and comparisons with the "reference protein" indicate that lysine, tryptophan, methionine, isoleucine, valine and threonine was the likely order for the limiting amino-acids. These experiments appear to strengthen the validity of the figures ascribed to lysine and tryptophan in the "reference protein" but suggest that the figure for methionine may have been set too high. *R. Passmore*

MATTHEW, C. E. & DEAN, R. F. A. **The Serum Lipids in Kwashiorkor. II. The Relation of Diet to Total Serum Cholesterol.** *J. Trop. Pediatrics.* London. 1960, Mar., v. 5, No. 4, 135–40, 3 figs.

The serum cholesterol usually rises after the start of treatment in kwashiorkor. This is probably due, in part at least, to release of cholesterol from the liver, consequent upon the general removal of lipids from this organ [this *Bulletin*, 1957, v. 54, 1224]. The magnitude of the rise in serum cholesterol is very variable and in part dependent on the diet. In children receiving a fat-free diet there is often a rise to a peak on about the 10th–14th day and thereafter a small decline. If butter is added to the diet, there is a steady rise to a higher level. With cotton-seed oil or with dietary fat provided by a biscuit containing both ground-nut and cotton-seed oil, the serum cholesterol also rises but to a lower level. In discussion it is suggested that protein as a source of cholesterol may be overlooked. *R. Passmore*

SCHRIRE, V. & GANT, J. **The Electrocardiographic Changes associated with Beri-Beri Heart Disease. An Analysis of 50 Cases studied at Groote Schuur Hospital, Cape Town, during a Period of 5 Years.** *South African J. Lab. & Clin. Med.* 1959, Dec., v. 5, No. 4, 195–235, 17 figs. [142 refs.]

The electrocardiographic studies were made in 50 patients with beriberi (mostly alcoholics). In just over half the electrocardiograms were normal. Transient T wave inversion and ST segment changes were a feature in some patients.

The results are set out in great detail, with numerous electrocardiographic figures, several case reports and a full discussion and review of the literature.

[See also PALLISTER, this *Bulletin*, 1955, v. 52, 391.]

R. Passmore

HAEMATOLOGY

DALAND, G. A. **A Color Atlas of Morphologic Hematology with a Guide to Clinical Interpretation.**

This book was reviewed on p. 764.

CASLEY-SMITH, J. R. **The Haematology of the Central Australian Aborigine. II. White and Differential Counts; Eosinophil Counts and Casoni Tests.** *Australian J. Exper. Biol. & Med. Sci.* 1959, Oct., v. 37, Pt. 5, 481–7. [18 refs.]

"Total leukocyte and differential counts were performed on a group of aborigines. These lived under semi-detribalized conditions at Haast's Bluff. A control series was taken of Europeans living at Adelaide.

"The total leukocyte and absolute lymphocyte counts were slighly but significantly raised in the aborigines. The eosinophil counts were markedly increased in the aborigines.

"Direct eosinophil counts were performed on nomads visiting Haast's Bluff. These also had greatly raised values. Many of them had positive Casoni tests. Those with positive tests had more eosinophilia than those with negative reactions. Hospital natives had fewer positive reactions."

SONNET, J. Les anémies hémolytiques par déficience de l'érythrocyte en deshydrogénase du glucose-6-phosphate. [**Haemolytic Anaemias caused by Erythrocyte Deficiency in Glucose-6-Phosphate Dehydrogenase**] *Méd. Afrique Noire*. Dakar. 1960, Apr. 16–30, v. 7, No. 8, 161–4, 4 figs. [34 refs.]

A general account and review of the literature.

See this *Bulletin*, 1960, v. 57, 514.

HENDRICKSE, R. G. **Sickle Cell Anaemia in Nigerian Children.** *Central African J. of Med.* 1960, Feb., v. 6, No. 2, 45–57, 9 figs. [34 refs.]

This is a comprehensive and valuable clinical description of sickle-cell anaemia as seen in 75 Nigerian (mostly Yoruba) children. In most respects the disease

conformed to the usual pattern, but certain points are of special interest, and only these will be mentioned below.

The age at diagnosis, averaging 3·8 years in this series, is considerably higher than in the Belgian Congo [this *Bulletin*, 1955, v. 52, 1014] and Uganda. No cases were diagnosed under 6 months of age, 17 from 6 to 18 months, 17 from 1½ to 3 years, and the remaining 40 from 3 to 12 years [this adds up to 74]. No details are given of follow-up studies, or deaths, but the author has a definite impression that the prognosis is better in Nigerians than in Central and East Africans.

Seen against the welter of tropical disease, anaemia, and malnutrition, the " protean " manifestations of sickle-cell anaemia amount almost to a camouflage. It is therefore instructive that in dealing with symptoms, signs, and radiology, the author notices the specificity of changes in and around the bones and joints—the extremities in babies, the long bones and skull later, and the femoral head in adolescence.

Haematological findings, mostly in agreement with published accounts, are interpreted in what is undoubtedly the correct manner, that " crises " are not fundamentally haemolytic. It is noted that clinical crises often occur without an exacerbation of anaemia, and anaemia may increase rapidly without obvious clinical crises. [Indeed, the author might have gone further and pleaded for the abolition of the term " crisis " which has led to so much pre-judgment of events in this disease.] In 4 cases an anaemic episode was accompanied by megaloblastic change in the bone-marrow, and responded to folic acid.

Liver function tests regularly gave abnormal results at an earlier age than is usual in sickle-cell disease in America.

Some thoughtful observations are made on treatment. Transfusion is generally reserved for those with a Hb of less than 5 gm./100 ml., and caution is advised if there is cardiac enlargement, when an exchange transfusion should be considered. Priscoline often afforded dramatic relief of limb pains. Long-term malarial prophylaxis, and the use of antibiotics during exacerbations are recommended, as tending to reduce deleterious effects on the bone-marrow. A warning against the use of a tourniquet in limb surgery is given, for gangrene has resulted.

The last section discusses the differences in the aspect of the disease in different localities. Between Africa and America, the differences are felt to be explicable in terms of environment, with its overall influence on health and survival. Comparisons with the Belgian Congo are of greater interest. The author seems to favour the view that the earlier incidence in the Congo is related to the greater prevalence there of malaria, which may either accelerate the onset of the anaemia, or lead to the inclusion of malarial infants with the trait only. [A careful reading of the various Belgian reports does not lead the abstracter to this view.] One final feature is suggested as having an environmental basis; the characteristic findings in the hands and feet of African children may be due to vascular stasis, caused by the way in which African babies are pinioned for long periods, motionless and under slight pressure, to their mothers' backs. Certainly the concluding sentence is justified, that a careful appraisal of the effect of environmental factors on the disease might lead to an improvement in prognosis. *Alan B. Raper*

ANSTEY, L. & ELSTEIN, M. **Sickle-Cell Trait: a Family Study and a Report of Three Further Cases of Sickle-Cell Disease.** *South African Med. J.* 1960, Apr. 2, v. 34, No. 14, 282–4, 2 figs. [20 refs.]

The incidence of the sickling trait in the Cape Coloured population of South Africa has been estimated to be only 0·58% [this *Bulletin*, 1952, v. 49, 716]. It was therefore of interest to discover a Cape Coloured child suffering from sickle-cell anaemia, and this led to the delineation of two affected families which, united by two separate marriages, had produced a total of 3 subjects with the anaemia. 2 of the latter were sibs, aged 8 and 16. Their anaemia was not severe, and they showed unusually high proportions of Hb F, 25% and 28% respectively. This, together with the fact that sickling could not be demonstrated in the mother, raised the question of thalassaemia or Hb D as her contribution, but the former was eliminated by her normal values for Hb F and Hb A2 [erythrocyte morphology is not mentioned], and the latter by a solubility determination which indicated that her blood contained Hb S.

[It is not stated whether the mother's red cells were tested more than once for sickling, and this leaves it doubtful whether a potentially interesting genetic situation had been fully explored.] *Alan B. Raper*

TUTTLE, A. H. & KOCH, B. **Clinical and Hematological Manifestations of Hemoglobin CS Disease in Children.** *J. Pediatrics.* St. Louis. 1960, Mar., v. 56, No. 3, 331–42, 2 figs. [44 refs.]

The clinical manifestations of Hb SC disease at all ages have been described by HOOK and COOPER [this *Bulletin*, 1958, v. 55, 1042]. The present paper from Memphis, Tennessee, describes 18 Negro children with the disease, aged 9 months to 15½ years. It has to be noted that these cases were ascertained through the children's attendance at a paediatric clinic, and this series is not likely therefore to represent numerically the least affected children. However, there was one child aged 15 years, the second oldest in the series, who had no symptoms or signs. 3 others, aged 9 months, 18 months, and 2 years, were symptomless but had enlarged spleens.

Musculo-skeletal pains were present in all the remaining 14 children; they occurred in what is conventionally described as "crises", often after a mild respiratory infection, and affected the neighbourhood of the larger joints, but were sometimes manifested by pains in the neck, shoulders, or back. The affected areas were swollen and hot. The attacks were accompanied by malaise, pyrexia, and therefore closely simulated an infective disease. Rheumatic fever could be simulated (and one would think also poliomyelitis). Abdominal "crises", almost as frequent, followed the recognized pattern as in sickle-cell anaemia. Enlargement of the spleen occurred in 13 children, and was progressive; one child of 12 died with an infarcted spleen weighing 680 gm. Bone changes were less frequent than in sickle-cell anaemia, though one patient had multiple osteomyelitis and 2 others aseptic necroses. Cardiac enlargement was found in 7 of the children.

Full haematological findings are given in a Table, and agree with previous reports. The picture resembles sickle-cell anaemia, but is less severe, target cells are more constant and more numerous, and the proportion of alkali-resistant haemoglobin is less markedly raised. The latter component exceeded

2% in 8 of the 17 children over 1 year old, and the highest value recorded was 5%. It is pointed out that confident distinction from sickle-cell anaemia can only be made by electrophoretic analysis of the haemoglobin.

Alan B. Raper

VIZCARRONDO, E., MÉNDEZ CASTELLANO, H., DE SOSA, Josefina, ARENDS, T., HERNÁNDEZ, R. T. & LEAL, G. Enfermedad por hemoglobina C y talasemia. Revisión de la literatura y presentación de dos casos. [**Haemoglobin C Disease and Thalassaemia. Review of the Literature and Report of 2 Cases**] *Archivos Venezolanos Puericult. y Pediat.* 1959, Jan.–Mar., v. 22, No. 71, 1–17, 3 figs. [35 refs.]

SMITH, C. H., ERLANDSON, Marion E., STERN, Gertrude & SCHULMAN, I. The **Role of Splenectomy in the Management of Thalassemia.** *Blood.* 1960, Feb., v. 15, No. 2, 197–211, 7 figs. [26 refs.]

This is an important paper from the Cornell Medical Centre, New York. It is based on the prolonged observation of 58 children with Cooley's anaemia, and it not only defines the indications for splenectomy and the extent of the benefits that may be expected from the operation, but it also describes the late results and the complications. Half of the children concerned were submitted to splenectomy. It is apparent from a Table that all but 1 of the 14 deaths were in splenectomized children; this is not specifically commented upon, but it is clear that the operation was reserved for the most severely affected.

It was established by the use of normal donor blood, labelled with ^{51}Cr, that red cell survival was reduced in affected children with an intact spleen, while in those submitted to splenectomy the survival was prolonged somewhat beyond normal limits. This indicated that splenectomy eliminated an extracorpuscular haemolytic component of the disease, and this change was found to be maintained, probably indefinitely.

Clinically, the effects of splenectomy were gauged by the change in transfusion requirements, and it has to be remembered that *all* the children were transfused in such a manner as to maintain minimal Hb levels of 6·5 to 8·0 gm./100 ml. Usually the operation was considered obligatory when transfusion requirements began to rise steeply; and there was a sharp reduction in the need for blood after splenectomy. Data are given for the average monthly transfusion needs of 13 children for the year before operation, and for the post-operative period. In the first post-operative year the blood requirements were always more than halved, and any increase in requirements in subsequent years was always slight. This improvement is ascribed to the removal of the haemolytic factor already mentioned, but another factor probably enters; fewer transfusions means less suppression of the subject's own haemopoietic activity.

The above refers to the fate of donor cells. However, splenectomy probably does not alter the basic fact that the patient's own erythrocytes are intrinsically doomed to a reduced life-span It was possible in a few of the children to re-inject the patient's own Cr-tagged cells, and this showed that the half-life of the cells in 2 splenectomized children was as brief as in 4 severely affected children with intact spleens. Splenectomy therefore confers only "fringe benefits"; and it is clear that these will only be apparent in patients with fairly high transfusion needs.

Splenectomy results in an increase in well-being, and in a gain of weight. But eventually growth in height, and sexual development, are retarded, and these defects remain unaltered, and are unrelated to the age at operation.

Three important sequelae to operation were noted: (1) Cardiac failure occurred in 10 children, all but 1 of whom had been submitted to splenectomy. There was refractory congestive failure, with various arrhythmias. The cause is probably overloading of the myocardium with iron, and no way of obviating this has been discovered. (2) Benign non-specific pericarditis occurred in 8 children, 7 of whom had been splenectomized. All these attacks ended in recovery. (3) Increased liability to infections is recognized as a hazard of splenectomy in children, and this was confirmed in the present series. [This sequel to splenectomy shows that even under the stress of a continuous haemolytic process the spleen in Cooley's anaemia retains its immunological capacity.]

The authors have this to say about the indications for splenectomy:

" A critical problem in Cooley's anemia is the proper selection of patients for splenectomy. In the severely affected individual the need for splenectomy is clearly indicated when transfusion requirements are persistently increased, by massive splenomegaly, and by deterioration of the clinical condition. . . . Measurements with the use of radioactive chromium provide an insight into the rate at which transfused blood is being destroyed. In the patient with a markedly and persistently increased transfusion requirement, criteria for splenectomy are so obvious that these measurements are unnecessary."

This illuminating paper will undoubtedly improve the approach to a very difficult therapeutic problem.

[For earlier studies by these authors see this *Bulletin*, 1955, v. 52, 1015, 1134; 1959, v. 56, 353, 652.] *Alan B. Raper*

VENOMS AND ANTIVENENES

DETRAIT, J., IZARD, Y. & BOQUET, P. Séparation par électrophorèse des constituants toxiques des venins de *Naja naja* et de *Naja nigricollis*. **[Separation of the Toxic Components of the Venoms of *Naja naja* and *Naja nigricollis* by Electrophoresis]** *C.R. Soc. Biol.* 1959, v. 153, No. 11, 1722–4.

The following is a translation of the authors' summary:—

Naja naja from Cambodia develops a venom containing a neurotoxin having a physio-pathological action comparable to that of the venom of *N. nigricollis* from East Africa. The two neurotoxins isolated by electrophoresis behaved as antigens of closely related chemical composition. *H. J. O'D. Burke-Gaffney*

KATAYAMA, Y. **[Experimental Studies on the Effect of SH-Compounds upon Viper-Venom Diseases. I. Comparison of Effects of Various SH-Compounds on the Survival Time of Animals poisoned with Viper Venom]** *Japanese J. Nation's Health.* 1959, Dec., v. 28, No. 4, 693–6. [In Japanese.] **[II. Influence of Viper Venom on the Soluble SH Content in Blood and Change of SH Content in the Cases of Administration of SH-Compounds]** *Ibid.*, 697–705, 9 figs. [In Japanese.]

The English summaries appended to the papers are as follows:—

I. "Effects of various drugs on the survival time of animals poisoned with venom of viper, *Agkistrodon halys blomhoffii* (Boié), were investigated, and the results were as follows:

"(1) Intraarterial injection of sodium thiosulphate of glutathione into dogs and guineapigs poisoned with viper-venom prolonged their survival times as much as anti-viper-venom serum, while the effect of cysteine was lower than these drugs.

"(2) Anti-viper-venom serum, sodium thiosulphate, glutathione, cysteine, thioglycolic acid, taurine and BAL (British anti-Lewisite) were mixed with a lethal dose of viper-venom respectively. The mixture, the pH of which was adjusted to 7·0, was incubated at 37°C. for 24 hours and later injected subcutaneously into mice. Remarkable effects of the prolongation of the survival time were perceived in anti-viper-venom, sodium thiosulphate and glutathione groups, some effects in cysteine and thioglycolic acid groups, and no effects in taurine and BAL groups."

II. "The mechanism of efficacy of drugs on the venom of viper, *Agkistrodon halys blomhoffii* (Boié), was studied and the following results were obtained:

"(1) The viper-venom reduced the soluble SH content in blood of animals and this remarkable reduction suggested that they would soon die.

"(2) Anti-viper-venom serum weakened the toxicity of viper-venom by the antigen-antibody reaction in vivo, and prolonged the survival time of animals.

"(3) It was supposed that the administration of glutathione or sodium thiosulphate to animals poisoned with viper-venom would keep the activity of SH-enzymes at a normal level by the compensation of SH content in blood, and fortify the resistance of animals against the venom."

REID, H. A. **Sea-Snake Bite and Poisoning.** *Practitioner.* 1959, Oct., v. 183, No. 1096, 530–34, 1 fig.

Sea-snakes exist in over 50 species throughout the shallower tropical seas; all are able to secrete a highly toxic venom through small, fixed fangs. Their length varies from 1 to 10 feet and all are distinguishable from land and water-snakes by the shape of their tails, which are flat and rudder-like. Water-snakes, which are harmless to man, have round, tapering tails, resembling those of land-snakes. Sea-snakes have valved nostrils enabling them to dive to the sea-bed where they feed on a variety of fish.

Sea-snake bite is a very rare hazard to bathers, but is an occupational hazard to fishermen working in river estuaries. It should be remembered that significant envenomation occurs in only a minority of bites; also that such bites, even when venom is injected, give rise to little local swelling or pain, in contrast to fish-stings, which are extremely painful.

Sea-snake venom has unique properties in that it is primarily myotoxic, but also causes renal tubular necrosis and centrilobular necrosis of liver cells. It is neither coagulant nor anticoagulant, nor does it cause significant haemolysis, nerve poisoning or local tissue necrosis Absorption is rapid and symptoms develop within 30–60 minutes: in those who are free from muscle pain and stiffness 1 hour after being bitten it is safe to assume that no further symptoms will develop.

The initial symptoms are due to muscle damage which is ushered in by an aching stiffness and immobilization from extreme pain on movement, later true weakness develops. In severely affected patients a condition strongly resembling a muscular dystrophy may develop and may pass off gradually over a period of months. Tendon reflexes are often lost. Myoglobinuria is manifested by a brown discoloration of the urine which gives rise to a characteristic absorption band on spectroscopic examination. Within an hour or two a gravely affected patient will complain of difficulty in movement of the eyes, tongue, and jaw, and may suffer from thirst, sweating, vomiting and respiratory distress.

Albuminuria and microscopic haematuria accompanied by myoglobinuria develop about 8 hours after severe envenomation, impaired renal function may persist for some weeks and permanent tubular damage may ensue. Permanent damage to muscle, nerve and liver parenchyma does not occur however.

The mode of death in the small minority of fatalities (some 5% of those bitten) is respiratory failure, acute renal failure, hyperkalaemic cardiac arrest or general toxaemia.

Treatment is largely supportive. Local extraction of venom is not practicable, though a tourniquet may prevent the absorption of a lethal dose of venom over a short period. No specific antivenene is yet available. Steroid therapy, aiming to minimize tissue damage and to aid the renal excretion of potassium, seems ineffective. Impaired renal function must be managed by the Bull régime, allowing 700–1000 ml. of fluid daily on account of the tropical climate. The renal excretion of venom and myoglobin may be facilitated in the early stages by drinking a litre of water or by the intravenous infusion of 1 litre of a solution composed of 25% glucose, 10% calcium gluconate and molar sodium lactate. Respiratory paresis is best treated in a tank respirator.

[This admirable summary of a fascinating subject is commended to all those interested in snake bite. See also this *Bulletin*, 1958, v. 55, 314.]

J. H. Walters

TOXOPLASMOSIS

Radacovici, Ecaterina & Atanasiu, Maria. Contribuţii la studiul toxoplasmozei umane în ţara noastră. [**Contributions to the Study of Human Toxoplasmosis in Rumania**] *Microbiol., Parazitol., Epidemiol.* Bucharest. 1959, July–Aug., v. 4, No. 4, 329–35. [25 refs.]

Between 1953 and 1957 the authors have investigated 326 cases of suspected toxoplasmosis, mostly in children, treated in various hospitals in Bucharest, Rumania. The dye test was positive in 60 instances (18·4%), including 25 of 153 children (16·34%), 16 of 78 mothers (20·51%) and 10 of 41 patients suffering from diseases of the eye (24·4%).

Positive results were obtained in complement-fixation tests in 8 of 107 patients (8%). Toxoplasms were isolated by the inoculation of mice and hamsters with material obtained at autopsy from 3 children with congenital malformations who died of acute congenital toxoplasmosis. In a further 11 cases toxoplasms could be observed in stained impressions from the organs of infected mice but could not be isolated in culture.

D. J. Bauer

SÉNÉCAL, J., PELLEGRINO, A., LARIVIÈRE, M. & AGBESSY, V. Toxoplasmose congénitale chez un enfant noir. [**Congenital Toxoplasmosis in an African Child**] *Bull. Soc. Méd. Afrique Noire Langue Française*. Dakar. 1959, v. 4, 440–44. [39 refs.]

The child was 9 months old. This is claimed as the first such case in an African.

SMITS, M. W. Een geval van de glandulaire vorm van toxoplasmose. [**A Glandular Form of Toxoplasmosis**] *Nederl. Tijdschr. v. Geneesk.* 1960, Apr. 23, v. 104, No. 17, 825–7. [20 refs.]

The English summary appended to the paper is as follows:—

"A glandular form of toxoplasmosis in a woman of 22 is described and the previously recorded cases are briefly reviewed. Clinically the condition resembles infectious mononucleosis."

SILVERMAN, Beatriz & VARELA, G. **Toxoplasmosis, Mental Disease and LSD-25.** *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1958, Dec., v. 18, Nos. 3/4, 191–4.

The chromatophores of *Lebistes* expand when the fish is submerged in water containing LSD-25 (D-lysergic acid and diethylamide); also in water containing pyridine extracts of organs or fluids infected with *Toxoplasma gondii*. It is suggested that the active substance in these extracts is a substance similar to LSD-25 [this *Bulletin*, 1958, v. 55, 1166]. LSD-25 produces psychoses if given to normal people; toxoplasmosis also is associated with mental abnormalities [*ibid.*, 1959, v. 56, 880]. Could the latter be due to the presence of LSD-25?

The cerebrospinal fluid was accordingly tested for its effect on *Lebistes*, in 74 patients with mental disorders (chiefly schizophrenia); at the same time the dye test was performed. 54% gave a positive reaction with the fish (supposedly indicating LSD-25) and 63% with the dye test (indicating past or present toxoplasmosis); 46% were positive for both tests. In 60 normal controls, none gave a positive reaction with the fish; the dye test is known to be positive in 29% of the normal population. When the dye test titre was 1 in 128 or higher, 90% of such people showed a positive fish test. The fish test was positive in 70% of schizophrenics showing frank disorientation and excitation as compared with 14% of those showing mutism and catatonia.

P. C. C. Garnham

DERMATOLOGY AND FUNGUS DISEASES

PALOUZIER, M. & CAMAIN, R. Un cas de rhinosporidiose à *R. seeberi* en Côte d'Ivoire. [**A Case of Rhinosporidiosis due to *R. seeberi* in the Ivory Coast**] *Bull. Soc. Méd. Afrique Noire Langue Française*. Dakar. 1959, v. 4, No. 4, 412–13.

Foley, J. M., Berman, R. J. & Smith, C. E. **X-Ray Irradiation of *Coccidioides immitis* Arthrospores: Survival Curves and Avirulent Mutants Isolated.** *J. Bacteriology*. 1960, Apr., v. 79, No. 4, 480–87, 7 figs. [30 refs.]

"X-ray survival curves have been obtained for arthrospores of *Coccidioides immitis*, using suspensions which were shown by nuclear stains to contain uninucleate and binucleate spores in a ratio of 1:1. The curves are sigmoid, in shape and the LD_{50} is approximately 14 kiloroentgens. Two auxotrophic avirulent mutants have been isolated from among the survivors of 80 to 100 kiloroentgens of irradiation. The characteristics of these mutants have been described."

Baker, K. C. & Kemberling, S. R. **Coccidioidal Granuloma after Treatment with Amphotericin B. Report of a Case.** *Arch. Dermat.* 1960, Mar., v. 81, No. 3, 373–7, 8 figs. on 2 pls. [13 refs.]

Until the introduction of amphotericin B, the prognosis in disseminated and focal coccidioidomycosis was unfavourable. This case history, together with 2 further brief reports in an addendum, testify to the remarkable efficiency of this new fungistatic antibiotic.

The patient, a Papago Indian boy at the age of 3 years was admitted to hospital at Tucson, Arizona, with weeping granulomatous skin lesions over the scrotum, perineum and gluteal fold, also on the arms. Irradiation was given with subsequent healing, but fresh lesions appeared at the same sites 18 months later. Further treatments with ethyl vanillate, antibiotic ointment, erythromycin and hydrocortisone and finally tetrahydroxyquinone all proved unavailing, and wide excision of the perianal lesion with a permanent colostomy was contemplated.

However, in March 1958, 2½ years after the onset of the new lesions, the intravenous infusion of amphotericin B was begun. The initial dose was very small—5 mgm. dissolved in 500 ml. of distilled water—and was infused slowly into a vein together with 1000 units of heparin. The dosage was rapidly built up to 1·0 mgm. per kgm. body weight, which was given daily for 6 weeks, then every second day to a total of 800 mgm. over 11 weeks. The injection period was covered by a tranquillizer, promazine, and an antihistamine, benadryl, given by mouth.

After discharge from hospital he received a weekly injection of amphotericin at the same dosage to complete 1 year's treatment.

The benefit induced by the drug was striking and is clearly seen in 4 impressive serial coloured photographs. The granulations had practically disappeared after the initial 11 weeks' treatment, while at 15 weeks only soft, depigmented scars remained. 4 months after cessation of treatment there was no sign of recurrence.

In the addendum the response to treatment of the disease in 2 Spanish-American adults is described. The immediate benefit was equally impressive, and is illustrated by impressive colour photographs of one patient.

[This is an impressive result in this hitherto intractable disease.]

J. H. Walters

TROPICAL OPHTHALMOLOGY

SOWA, J. & COLLIER, L. H. **Isolation of Trachoma Virus from Patients in West Africa.** *J. Hygiene.* 1960, Mar., v. 58, No. 1, 99–108, 3 pls. [11 refs.]

Perhaps the principal interest in this paper is the demonstration that trachoma virus, though susceptible to sulphonamides and most antibiotics like other members of the psittacosis-lymphogranuloma group of agents, is resistant to streptomycin. Suspension of the conjunctival scrapings in 0·85% saline containing 20,000 μgm. streptomycin per ml. was not detrimental to the chick embryo, greatly reduced bacterial contamination and facilitated isolation of the virus. Virus was isolated from 24 of 30 patients in whom direct microscopy of conjunctival scrapings revealed inclusions in only 18. Virus, when isolated, can always be detected in smears made from the yolk sacs of the primary eggs; no more than one passage is necessary. In no instance did the authors isolate trachoma virus from non-trachomatous or inclusion-negative persons, which suggests that the carrier state is rare or non-existent.

[See also this *Bulletin*, 1959, v. 56, 95.] *S. P. Bedson*

GORDON, F. B., QUAN, Alice L. & TRIMMER, R. W. **Morphologic Observations on Trachoma Virus in Cell Cultures.** *Science.* 1960, Mar. 11, v. 131, 733–4, 2 figs.

This paper reports the successful cultivation of trachoma virus in chick embryo entodermal cells. Portions of entoderm from 4-day embryos were explanted to coverslips and grown at 36°C. under Hanks balanced saline containing 25% chicken serum. The inoculum was provided by a yolk-sac-passage strain of the virus purified by trypsinization and differential centrifugation. Intracytoplasmic colonies were first detected 18 hours after infection. They passed through the various developmental stages characteristic of the agents of the psittacosis-lymphogranuloma group in the course of 72 hours. Centrifugation of the inoculum onto the cells was found advantageous.

S. P. Bedson

MISCELLANEOUS DISEASES

HATHORN, M., GILLMAN, T., CANHAM, P. A. S. & LAMONT, N. McE. **Plasma Iron and Iron-Binding Capacity in African Males with Siderosis.** *Clin. Sci* 1960, v. 19, No. 1, 35–43, 3 figs. [20 refs.]

100 African male patients, aged between 16 and 75 years, were examined by liver biopsy and their plasma iron and total iron binding capacity was measured. According to their liver histology they were divided into five groups, as follows:

Group 0: No iron demonstrable in liver.
Group 1: Hepatocellular siderosis—iron granules confined to liver cells.
Group 2: Iron granules and clumps in liver cells, sinusoidal Kupffer cells, with only mild accumulation of iron in portal phagocytes.
Group 3: As for Group 2, but with heavy accumulations of iron in portal tracts.

Group 4: Only 5 cases, in which fine iron granules were found only in sinusoidal Kupffer cells. These cases do not conform with the usual pattern of hepatic siderosis seen in Union Africans.

There was a strong correlation between the mean plasma iron level and the degree of hepatic siderosis. 22 of the patients had evidence of infection, which is known to depress the plasma iron level. In the remainder the rise in mean plasma iron accompanying increasing siderosis was even more significant. There was no connexion between the level of plasma iron and the presence or absence of portal fibrosis or cirrhosis and post-necrotic scarring. In primary liver carcinoma the plasma iron was usually low. The total iron binding capacity was also higher in the siderotic patients than in those without siderosis (Group 0). However, once hepatic siderosis was present the degree of iron binding capacity was independent of the severity of the lesion. No relation could be discovered between plasma iron and total iron binding capacity in Groups 0 and 4. There was, however, a significant correlation in Groups 1, 2 and 3.

These findings also demonstrated that a failure to show raised plasma iron and total iron binding capacity does not necessarily exclude the diagnosis of hepatic siderosis in Africans. In such cases, liver biopsy will have to be resorted to if the clinical features suggest siderosis. On the other hand, a plasma iron value above 150 μgm./100 ml. would suggest the presence of hepatic siderosis provided other obvious causes of high plasma iron, such as infective hepatitis, are excluded. Similarly, a total iron binding capacity above 360 μgm./100 ml. would, in the Natal (Bantu) African, be suggestive of hepatic siderosis. This condition, in the African, where an elevated plasma iron is associated with a raised iron binding capacity and consequently, therefore, with a relatively normal iron saturation, is quite distinct from the abnormalities of iron metabolism seen in Europeans with idiopathic haemochromatosis or secondary siderosis after transfusions.

[See also this *Bulletin*, 1957, v. 54, 1364; 1958, v. 55, 443.] *H. Lehmann*

LAMONT, N. McE. & HATHORN, M. **Increased Plasma Iron and Liver Pathology in Africans with Porphyria.** *South African Med. J.* 1960, Apr. 2, v. 34, No. 14, 279–81, 4 figs. [11 refs.]

A group of Africans with porphyria (13 males and 2 females) were examined for liver disease and abnormalities of plasma iron. None of the patients was anaemic. The plasma iron was examined in 12 patients, and was above 200 μgm./100 ml. in 10. The 2 patients with normal values were suffering from acute dysentery, and the authors point out that infections are known to depress iron levels. The values for total iron binding capacity were less consistent, being elevated in 1, decreased in 5, and normal in the other 6 patients. There was complete saturation of the total iron binding capacity in 7 of the 12 patients. Liver biopsies were performed in 15 patients, and iron-containing pigment was seen in significant amounts in 12. The distribution was different from that usually seen in siderosis. The iron seemed to be more noticeable in the Kupffer cells than in the parenchymal cells. None of the patients presented accumulation of iron as heavy as is commonly seen in siderotic patients.

As the authors point out, the presence of a distinct type of hepatic injury in all these patients can hardly be coincidental, and the association of the histological changes with elevated plasma iron levels may well provide a clue to the causation of the liver damage and the disturbances in both porphyrin and iron metabolism in these Africans.

[See also this *Bulletin*, 1959, v. 56, 884.] *H. Lehmann*

JHA, C. D. & SINHA, Y. K. **Histamine Content of Blood and Skin Sensitivity to Histamine.** *Indian J. Med. Res.* 1960, Jan., v. 48, No 1, 41–5, 1 graph. [20 refs.]

In order to prove the allergic basis of tropical eosinophilia the authors set out to determine the histamine content in the blood of patients with this condition, and to investigate their skin reaction to histamine. 58 patients showing characteristic clinical, radiological and haematological findings—the absolute eosinophil count being in excess of 3,000 per cmm.—comprised the experimental group; 12 healthy adults, having absolute eosinophil counts below 750 per cmm. served as a control group.

Blood histamine levels were estimated by a biological method employing atropinized guineapig ileum, and skin sensitivity by iontophoresis [in which the histamine is caused to enter the skin by ionization]. A positive reaction to the skin test was shown by erythema and papule formation which might coalesce to form a wheal.

The blood histamine content of the control group showed a range of 0·02 to 0·13 μgm. per ml., with a mean of 0·057 $\pm$ 0·026. In the experimental group a higher range was demonstrated—from 0·076 to 0·459 μgm. per ml. [the latter is erroneously printed as 0·0459 μgm. per ml.]; the mean figure was 0·23 $\pm$ 0·095 μgm. per ml. Thus the histamine content of the blood of patients suffering from tropical eosinophilia was 5 times greater than that of controls, a difference which was statistically significant.

Skin sensitivity to histamine was investigated in 27 patients showing tropical eosinophilia, and in 8 subjects out of the control group. On histamine iontophoresis, all but one subject of the control group showed a negative reaction; in the exceptional subject a moderate sensitivity was evident. Among the 27 experimental subjects 25 showed either marked or extreme sensitivity, while only 2 gave a reaction indicative of moderate sensitivity.

The histamine content of the blood in the experimental subjects however showed little relationship to the absolute eosinophil count, nor was there any parallelism between the latter and the skin sensitivity to histamine. The authors therefore suggest that it is the tissues rather than the eosinophil leucocytes themselves that provide the source of the histamine, and that the eosinophil cells may, in fact, be mobilized in order to dispose of the excess of histamine in the circulation and tissue fluids. They consider that their findings confirm the allergic basis of tropical eosinophilia. *J. H. Walters*

LEVINE, H. B. & WOLOCHOW, H. **Occurrence of Poly-β-Hydroxybutyrate in *Pseudomonas pseudomallei*.** *J. Bacteriology.* 1960, Feb., v. 79, No. 2, 305–6.

CHAMBON, L. Analyse sérologique de l'antigène somatique de *Malleomyces pseudomallei*. [**Serological Analysis of the Somatic Antigen of** *Malleomyces pseudomallei*] *Ann. Inst. Pasteur*. 1960, Mar., v. 98, No. 3, 405–15.

Examination of 96 strains of *Malleomyces pseudomallei* [*Pfeifferella whitmori*], of human and animal origin, showed that the somatic antigen is not homogeneous.

Agglutinin-absorption tests showed that strains 14, 18, and C141 shared antigens. There was a common antigenic fraction in strains 14 and 18—antiserum to strain 14 agglutinated both strains, but antiserum to strain 18 did not agglutinate strain 14. It is suggested that this may be explained by the following antigenic formulae:—

strain 14: A + b
strain 18: B + b

where b is a minor antigenic fraction of antigen B, and the ratio of b/A in strain 14 is lower than that required to show agglutination in strain 18 antiserum.

Strains 14 and 18 together completely absorb all agglutinins from antiserum to strain C141, and the antigenic formula for this strain is thought to be A + B + b. The somatic antigen A of strain 14 was shown to be composed of the major antigen A and a minor antigen a.

The other 93 strains of *M. pseudomallei* were found to correspond to these 3 antigenic groups. One strain resembled strain 18 and the other 92 resembled strain C141.

Strains of *M. pseudomallei* may therefore be classified into 3 antigenic types *viz.*:—

(1) possessing antigens A + a + b (strain 14)
(2) possessing antigens B + b (strain 18 and 1 other strain)
(3) possessing antigens A + B + b (strain C141 and 92 other strains).

May F. McCallum

PARASITOLOGY: GENERAL

MUMFORD, E. P. **The Distribution of some Parasites of Man in the Near and Middle East.** *J. Trop. Med. & Hyg.* 1960, Apr., v. 63, No. 4, 77–85. [53 refs.]

Because of its geographical position and its vast oil resources the Near and Middle East is of great importance to the rest of the world, and it is valuable to have information on health conditions there [this *Bulletin*, 1959, v. 56, 1070]. It is pointed out, for example, that industrial organizations would wish to know what parasitic and other diseases had been reported recently in areas to which members of their staffs might be assigned. It was from a suggestion on this point that the author, who is Professor of Biology in the Dominican College of San Rafael, California, set himself the task of searching for the latest available authoritative information on the distribution of parasitic disease in man in the Near and Middle East.

In this paper he presents a compilation from available literature of 9 protozoal and 20 helminthic diseases and their distribution in the area in question. This area is not easy to define, as the terms describing it are often used somewhat loosely. For the purposes of this paper, he has adopted the view of the Royal Geographical Society, whom he has consulted, that the eastern Mediterranean area should be designated "Near East" and that the term "Middle East" should denote territories further to the east. He therefore includes Egypt, Israel, Jordan, Lebanon, Syria and Turkey in the Near East and Iran, Iraq and Saudi Arabia in the Middle East.

A table shows, alphabetically in diseases, the countries in which records of the particular parasitic infections have been obtained. Most of the infections were recorded in nearly all of the 9 countries, though there are notable gaps.

The table is followed by sections on each individual disease with all the available references to it from each country concerned.

The author took as his starting point the third volume of *Global Epidemiology* [SIMMONS *et al.*, this *Bulletin*, 1954, v. 51, 1319], so that the 53 references included are largely those appearing during the last 6 years. The compilation clearly cannot claim to be exhaustive, because records of some of the infections from some of the countries are necessarily scanty and it would hardly be possible at present to provide a really authoritative indication of numerical incidence in these areas as a whole: but the paper covers the relevant literature available and as such is a useful source of reference for those requiring the kind of information provided. *H. J. O'D. Burke-Gaffney*

KUNTZ, R. E. **Intestinal Protozoa and Helminths in School Children of Dacca, East Pakistan (East Bengal).** *Amer. J. Trop. Med. & Hyg.* 1960, Mar., v. 9, No. 2, 168–72.

This is an account of a survey made by the author while acting as a member of the United States Naval Mission to East Pakistan, in an area where few data were previously available of the incidence of parasites and other intestinal microfauna. The survey was based on the study of a single faecal sample from each of 300 students from 6 to 18 years of age residing in the vicinity of Dacca.

A table summarizing the results of the study includes the names of 11 species of intestinal protozoa and 12 helminths. *Entamoeba histolytica*, *E. coli* and *Endolimax nana* were prevalent, the small non-pathogenic race of *E. histolytica* being much more common than the larger race. *Balantidium coli* and *Isospora* were uncommon, only a single infection with each being detected. Hookworm, *Ascaris* and *Trichuris* were present in a high percentage of patients and eggs of *Hymenolepis nana* were found in a single stool. An unidentified acanthocephalan was recorded, as well as a single infection with *Fasciolopsis* and *Diphyllobothrium* and 3 with *Haplorchis taichui*. All the specimens examined contained at least one species of parasite. *G. Covell*

MCCARTHY, D. D. **The Incidence and Distribution of Intestinal Parasites in the Cook Islands.** *New Zealand Med. J.* 1959, Dec., v. 58, No. 328, 749–56.

The specimens of faeces brought by the inhabitants were transferred to screw-top bottles containing a merthiolate-formalin mixture as a preservative.

The material thus collected was examined, at a considerably later date, at a base laboratory by means of the ether-centrifuge technique of BLAGG *et al.* [this *Bulletin*, 1955, v. 52, 700].

The most common intestinal worms were *Ascaris lumbricoides* and *Trichuris trichiura*. *Necator americanus* is present in the Southern Islands but absent from the atolls. The cysts of *Entamoeba histolytica* occurred in just over 5% of the population in all age-groups. Specimens of faeces from the inhabitants of Rakahanga contained trematode eggs; these eggs resembled those produced by flukes parasitic in the biliary tracts of flying fish which are sometimes, but not commonly, eaten by the inhabitants. Cestode eggs, probably those of *Hymenolepis nana*, were recorded once only.

Detailed findings are shown in several tables. *R. M. Gordon*

COSGROVE, G. E. **Intestinal Parasites in the Panama Canal Zone.** *Amer. J. Trop. Med. & Hyg.* 1960, Mar., v. 9, No. 2, 173–4.

"Examination of 2,500 fecal specimens from ward and outpatients at Gorgas Hospital, Panama Canal Zone, revealed intestinal parasites in about 29%. The most common helminths were *Trichuris trichiura* and hookworm. *Giardia lamblia* was the most common protozoan. *Entamoeba histolytica* was found in about 4%. Approximately half of the various infections were accompanied by one or more others. The incidence figures were based on samples received for routine examination and may not reflect the true incidence of parasites in the Canal Zone population."

BENNETT, G. F. & FALLIS, A. M. **Blood Parasites of Birds in Algonquin Park, Canada, and a Discussion of their Transmission.** *Canadian J. Zool.* 1960, Apr., v. 38, No. 2, 261–73, 2 figs. [30 refs.]

"Fixed and stained blood smears of over 3,000 birds resident in Algonquin Park, Canada, have been examined for blood parasites. Sixty per cent. of the adults and 40% of the immature birds harbored one or more blood parasites. *Leucocytozoon* occurred in 60%, *Trypanosoma* in 48%, *Haemoproteus* in 26%, *Microfilaria* in 7%, and *Plasmodium* in 2% of the infected birds. High incidence and high parasitaemia of *Leucocytozoon*, *Trypanosoma*, and *Haemoproteus* coincided with the occurrence of large numbers of ornithophilic simuliids and *Culicoides* and preceded the time when most hippoboscids were recovered. Differences in incidence of parasites and the level of parasitaemia in different birds when considered in relation to the occurrence and feeding behavior of various ornithophilic flies suggest that simuliids are the vectors of *Trypanosoma*, and *Culicoides* transmit *Haemoproteus* in this area."

CAPERS, T. H. & LEE, Dorothy. **Pulmonary Cytomegalic Inclusion Disease in an Adult.** *Amer. J. Clin. Path.* 1960, Mar., v. 33, No. 3, 238–42, 2 figs. [19 refs.]

Organisms morphologically resembling *Pneumocystis carinii* were found in the lung of a Negro aged 30 in Texas.

DENNIG, H. K. Experimentelle Übertragung von *Babesia canis* auf Saugmäuse, **[Experimental Transmission of *Babesia canis* in Suckling Mice]** *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1959, Dec., v. 10, No. 4, 372–5, 3 figs.

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

SCHMIDT, C. H. & WEIDHAAS, D. E. **Effect of Varying Conditions in a Laboratory Testing Technique on the Mortality of Mosquito Larvae.** *J. Econom. Entom.* 1959, Oct., v. 52, No. 5, 977–9.

"The mortality of mosquito larvae increased as the volume of acetone-water suspensions or solutions of dieldrin, lindane, malathion, and DDT was increased from 100 to 1,000 ml. The increase was greater and more consistent with DDT than with the other larvicides and with larvae of *Anopheles quadrimaculatus* Say and *Aëdes taeniorhynchus* (Wied.) than with *Aëdes aegypti* (L.). No increase in mortality was caused with parathion. When the diameter of the test containers was increased from 3 to 6 inches but the concentration and volume of the suspensions or solutions were constant, mortality of *quadrimaculatus* decreased when dieldrin, lindane, and DDT were used, but not with malathion or parathion. No difference in mortality was observed with the other two species of larvae."

The dose of DDT absorbed [radiometrically determined] by the larvae generally increased with increasing volume. However, this increase was small and with *Aëdes taeniorhynchus* it was erratic.

When the diameter of the test containers was increased from 3 to 6 inches the dose of DDT absorbed decreased slightly with *A. quadrimaculatus* and *Aëdes aegypti* and considerably with *Aëdes taeniorhynchus*. *B. C. Fine*

KRISHNAMURTHY, B. S. & RAJINDAR PAL. **A Note on the Comparative Effect of Different Blood Feed on Egg Productions of** *C. fatigans*. [Research Notes.] *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1959, Jan., v. 7, No. 1, 27–9.

Females of strains of *Culex fatigans* from Delhi and Malaya, mated with males of the opposite strain, and hybrid females from similar crosses mated with hybrid males, have been fed on man and bird [unspecified]. The average number of eggs per egg raft laid by batches of females fed on man varied [apparently] from 0 to 148, and by females fed on bird from 0 to 264.

No eggs were produced by females of *Culex fatigans* from Delhi, mated with *Culex molestus* from Hamburg and fed on man, and similarly mated females fed on bird produced only a few infertile eggs and were found, on dissection, not to be inseminated. [It is difficult to see what experimental evidence the authors have used when they state that the difference in egg production between females fed on the two different blood sources is statistically significant.] *B. R. Laurence*

GILLET, J. & LEBIED, B. Observations sur *Simulium medusaeforme* var. *hargreavesi* (Gibbins) et *Simulium adersi* (Pomeroy) faites à Bukavu-Kivu, Congo belge. [**Observations on** *Simulium medusaeforme* **var.** *hargreavesi* **and** *S. adersi* **at Bukavu-Kivu, Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1959, Dec. 31, v. 39, No. 6, 823–30.

HIDALGO ESCALANTE, Esperanza. Simulidos del Estado de Morelos (Dipt. Simuliidae). [*Simulium* **in the State of Morelos, Mexico**] *Acta Zool. Mexicana.* 1959, May 1, v. 3, Nos. 1/2, 1–63, 3 pls. & 12 maps. [42 refs.]

PETRISHCHEVA, P. A. **Field Methods of investigating Sandflies and Anti-Sandfly Measures.** 1954. Moscow. pp. translated from Russian 3–4, 109–84, 185–6. [Translation 26 (72 mimeographed pp.), Dept. Med. Zool., U.S. Nav. Med. Res. Unit No. 3, c/o American Embassy, Cairo.]

These notes on field methods used in the Soviet Union during investigations into the biology and control of *Phlebotomus* should be obtained in the original or in this translation by anyone so engaged elsewhere in the world. The bibliography of 114 titles alone is a useful guide to the Russian literature, consisting, in fact, exclusively of papers by Russian authors.

One of the most useful sections is on methods of rearing sandflies. A recommended nutrient medium for the larvae is one made out of fresh leaves of plants cut into fine pieces and stirred with the finely ground excrement of cattle in the proportion of 1:1. This mixture is slightly moistened to make a paste and is "ripened" for 30–45 days. The author states that development can be completely accomplished only on the decomposing leaves of plants. There are extensive notes on methods for rearing sandflies under various conditions, and also an account of a method for continuous rearing.

Methods for dissection and mounting, and for estimating the stages of the gonotrophic cycle, are also described.

Most of the paper is concerned with the organization of control programmes. The emphasis here is on the fact that a knowledge of the biology of the vector is essential. By releasing marked specimens and recapturing on sticky traps it has been shown that, if suitable hosts are present, only about 1% of the population of flies migrates over distances greater than 25 metres, and that most are restricted to a range of 12–15 metres. Under semi-desert conditions, where conditions are less favourable, migration for distances up to 1½ kilometres have been recorded. The restricted flight range permits control methods to be concentrated for 2–3 kilometres around new settlements and, in well established towns which are already foci for leishmaniasis, after anti-sandfly measures for 3 years in succession, control can then be concentrated on the isolated foci of infection.

Methods for personal protection, elimination of breeding places, reduction of the rodent population (especially gerbils), and methods of estimating the effectiveness of the control programmes are described in detail. Two appendices give a "Calendar Plan of Antiepidemic Measures in a Focus of Sandfly Fever under Turkmenistanian Conditions" and instructions for anti-rodent measures in foci of cutaneous leishmaniasis. *B. R. Laurence*

British Museum (Natural History). Economic Series No. 1. **The House-Fly as a Danger to Health. Its Life History and how to deal with it.** 7th Edition. 17 pp., 11 figs. 1959. London. [1s. 6d.]

Winteringham, F. P. W. **Phosphorylated Compounds in the Head and Thoracic Tissues of the Adult Housefly, *Musca domestica* L., during Flight, Rest, Anoxia and Starvation.** *Biochem. J.* 1960, Apr., v. 75, No. 1, 38–45, 1 fig. [32 refs.]

Piquett, P. G., Gersdorff, W. A. & Alexander, B. H. **Screening Tests with Synthetic Compounds as Synergists for House Fly Sprays.** *J. Econom. Entom.* 1960, Apr., v. 53, No. 2, 299–301.

"Fifty-six synthetic compounds were tested in space sprays by the Campbell turntable method against houseflies, *Musca domestica* L., as synergists with pyrethrins or allethrin. The most effective compounds were the butyl 2-methyl-3-(3,4-methylenedioxyphenyl) propyl acetal of acetaldehyde and its isobutyl analog."

Brooks, G. T. **Mechanisms of Resistance of the Adult Housefly (*Musca domestica*) to 'Cyclodiene' Insecticides.** [Correspondence.] *Nature.* 1960, Apr. 2, v. 186, 96–8, 1 fig.

Some years ago, Busvine [this *Bulletin*, 1955, v. 55, 222] showed that house-flies resistant to chlorinated cyclodiene insecticides were considerably more resistant to aldrin and dieldrin than to their isomers isodrin and endrin. The present author confirms this and uses these 4 compounds marked with radio-active carbon to investigate possible reasons for this difference. His experiments show that there were no substantial differences in penetration rates of the various compounds, topically applied to resistant or normal house-flies. The metabolism of the compounds was also investigated, aldrin and isodrin being converted to their corresponding epoxides dieldrin and endrin. This process, which was partly internal and partly in or on the cuticle, continued at about the same rate in resistant and normal flies; and the same was true of the production of a non-toxic metabolite (probably a ketone re-arrangement of isodrin and endrin).

Further experiments could reveal no difference between normal and resistant strains in rates of excretion of the toxicants, nor in the quantities stored in the tissues. These radioactive measurements confirm the preliminary bio-assays of Busvine and suggest that resistance to this group of insecticides does not depend on detoxication processes. *J. R. Busvine*

Dickerson, G. & Lavoipierre, M. M. J. **Studies on the Methods of feeding of Blood-Sucking Arthropods. III. The Method by which *Haematopota pluvialis* (Diptera, Tabanidae) obtains its Blood-Meal from the Mammalian Host.** *Ann. Trop. Med. & Parasit.* 1959, Dec., v. 53, No. 4, 465–72, 3 figs. [19 refs.]

Previous papers of the series were on the feeding mechanism of triatomine bugs and bed bugs [this *Bulletin*, 1960, v. 57, 19 and 661] with the use of

cultured insects. The present work is with the tabanid, *Haematopota pluvialis*, wild-caught in Cheshire. They were very reluctant to feed in the laboratory, although captured when seemingly coming to feed. The interpretation of the feeding mechanism is compounded from direct observations with the apparatus previously used and described, and histological material. The apparatus was not wholly suitable for studying *Haematopota*, and this is essentially a preliminary report only.

The structure and functioning of the mouthparts are figured, including a cross-section. All parts, except the labium and its labellar lobes, are thrust into the skin as a composite fascicle. None was observed to be capable of distal flexure within the skin. The mandibles cut by a shear-like action one with the other; the maxillae rasp by to and fro movements. As described by others for *Chrysops* [*ibid.*, 1953, v. 50, 747], *Haematopota* lacerates capillaries and larger vessels and feeds from the intercapillary haemorrhage in the tissues. It is thought that the labellar lobes may function in drinking up water or other free fluids, but not in imbibing blood. Saliva could not be seen to be discharged but this was probably a question of technical difficulty in observation.

D. S. Bertram

GREGSON, J. D. **Morphology and Functioning of the Mouthparts of** *Dermacentor andersoni* **Stiles. Contents.** *Acta Tropica*. Basle. 1960, v. 17, No. 1, 48–9. **Part I. The Feeding Mechanism in Relation to the Tick.** *Ibid.*, 49–72, 6 figs. [35 refs.] **Part II. The Feeding Mechanism in Relation to the Host.** *Ibid.*, 72–79, 6 figs. [15 refs.]

Part I is a detailed morphological account of the mouthparts of the adult female *Dermacentor andersoni*, and an interpretation of how they work in sucking up blood and ejecting salivary fluid while feeding. It is important not only as a study of this tick, but for its collation and comparisons with the mouthparts and their function in other ticks previously studied by various other workers. A technique for sectioning ticks at 10 microns is given.

Part II reports on direct observations of the same species of tick attaching to hosts and feeding, or feeding from capillary tubing. Cinemicrophotography was useful; the illustrations include frames from a film. The following points of special interest were noted. Female ticks if interrupted while feeding commonly re-attached readily even to another host (*e.g.* experimentally, from sheep to mouse ear). Once the superficial lacerations by the chelicerae are made in the host's skin, a white fluid flows from the mouthparts (presumed to be a salivary secretion) for about 10 minutes. It congeals quickly to form a cement cone or papule (thought by others to be a host reaction), aiding the attachment of the tick to the host. The chelicerae with their distal digits then probe and cut deeper. Salivary fluid is ejected when blood flows from a lacerated capillary. Repeated lacerations occur and the extravasated blood is sucked up. There is alternate salivation and sucking, probably every 5–30 seconds. Periodically, these activities may cease. Artificial feeding, as through a capillary, may fail to simulate these natural events, salivation being continuous or barely occurring at all.

Concerning detachment, a tick merely backs away leaving the cone on the skin when it detaches naturally. This is considered to be merely a mechanical facility dependent on the withdrawal of the chelicerae from the deeper tissues.

altering the close moulding of the cone round the mouthparts. The cone is usually, however, wrenched away on the mouthparts if detachment is artificial. Given a few minutes, the artificially detached tick will also get its mouthparts easily free of the cone.

This study was intended to elucidate factors bearing on salivary toxin in tick paralysis. A footnote comments that a weak anticoagulant was demonstrable in crushed glands.

A similar cement cone, or papule, probably occurs at least in *Amblyomma, Boophilus, Rhipicephalus* and *Ixodes*; perhaps not in fast-feeding argasids. It seems to be suggested that the feeding tube associated with trombiculid attachment [which goes deeply and is not superficial as is this tick cone] may be of a similar nature.

[These interesting findings appear to concern events in ticks already partly engorged on sheep for several days and transferred to a mouse ear to bite again and resume feeding. There may be need to qualify the findings in detail for some period after initial attachment when distension with blood is slow or inapparent.] *D. S. Bertram*

Bouckaert, L. & Fain, A. Een geval van nymphale porocephalose met dodelijk verloop. [*Armillifer armillatus* **Infection with Fatal Intestinal Obstruction**] *Ann. Soc. Belge de Méd. Trop.* 1959, Dec. 31, v. 39, No. 6, 793–7.

The English summary appended to the paper is as follows:—

"The authors describe a fatal case of intestinal obstruction of the colon at the hepatic angle, associated with inflammatory masses which had fused together the omentum, liver, and large intestine. All these tissues whether healthy or inflamed were crammed full of nymphs of *Armillifer armillatus*, which the authors consider played a causative role in initiating the obstruction."

Gast-Galvis, A. *Linguatula serrata* en un hígado humano. [*Linguatula serrata* **in a Human Liver**] *Bol. Chileno de Parasit.* 1960, Jan.–Mar., v. 15, No. 1, 15–16, 1 fig. [11 refs.]

The English summary appended to the paper is as follows:—

"An arachnid worm, identified as *Linguatula serrata,* is described from the liver of a 3-years-old girl from Samaná, Department of Caldas, Colombia. No previous report has been found of the occurrence of this parasite in man, in Colombia."

Dethier, V. G., Browne, L. B. & Smith, C. N. **The Designation of Chemicals in Terms of the Responses they elicit from Insects.** *J. Econom. Entom.* 1960, Feb., v. 53, No. 1, 134–6. [13 refs.]

The terms "attractant" and "repellent" are often loosely used. For example, sugar, on which flies tend to aggregate, seems unlikely to be able to exercise a chemical attraction at a distance, since its vapour pressure is so low. The authors discuss the subject in relation to basic principles of insect behaviour and suggest some more precise terms, depending on whether kineses or taxes are involved.

(1) *Arrestant.* This term is proposed for a chemical (*e.g.* sugar) which causes insects to aggregate because it reduces their tendencies to move away from it.

(2) *Locomotor stimulant.* A chemical which stimulates insects to move and hence, usually, to leave it (*e.g.* DDT).

(3) *Attractant.* A chemical which causes *oriented* movements towards itself.

(4) *Repellent.* A chemical which causes insects to make *oriented* movements away from it.

(5) *Feeding, mating or oviposition stimulants.* These are substances which elicit particular types of behaviour in insects.

(6) *Deterrent.* Chemicals which inhibit feeding, mating or oviposition behaviour are included under this term.

It is suggested that the use of more precise terms would clarify understanding and assist the planning of research programmes on the subject. *J. R. Busvine*

MISCELLANEOUS PAPERS

GARNHAM, P. C. C. **The Evolution of the Zoonoses.** Reprinted from *Med. Press.* 1959, Sept. 23, v. 242, No. 6281, 251–6. [17 refs.]

The author gives a brief review of the literature and a summary of his views on a subject which is of importance not only to workers in human and in veterinary medicine but to biologists as a whole. This succinct and valuable paper defies further abstraction and must be read in the original by those who are interested. *R. M. Gordon*

ABDUSSALAM, M. **Significance of Ecological Studies of Wild Animal Reservoirs of Zoonoses.** *Bull. World Health Organization.* Geneva. 1959, v. 21, No. 2, 179–86. [34 refs.]

This useful paper really needs to be read in full to appreciate the significance of the role of wild animals as reservoirs of human disease; the problem today is assuming great importance because the increase of the human population entails encroachment upon hitherto sparsely inhabited areas of the world, where the wild fauna with its hidden infections is lying in wait for the human immigrant. It is thus important to carry out faunal surveys in such regions and to study the ecology of the wild animals, particularly those known to be associated with dangerous diseases like plague, rabies, tularaemia, yellow fever and other arthropod-borne virus diseases. [These studies, incidentally, may provide the laboratory worker with new experimental animals like the hamster, cotton-rat, and gerbil.] The Russian approach with its doctrines of nidality and landscape epidemiology is described, and its application in North America, Australia and Malaya.

Among the general characteristics of the zoonoses should be particularly noted the ability of alternative hosts and vectors to maintain the infection where the natural or original ones have been eliminated. The process as it affects man is then described and the various courses are followed; changes in virulence may occur during this time or when the infection gets into a

domiciliated reservoir or vector. The factors to be studied are summarized and include (1) identification of the animal, (2) susceptibility to infection, (3) population dynamics of the reservoir host, (4) synecology (environment, predators, parasites), (5) food of the reservoir, (6) effect of the parasite on the host, (7) studies on the vector. *P. C. C. Garnham*

WHO CHRONICLE. 1960, May, v. 14, No. 5, 173–8, 6 figs. **Health Aspects of Urbanization in Africa.**

This paper begins with a brief glance back to Manchester slums in 1844 and the "host of diarrhoeal and respiratory diseases" which followed the overcrowding and poverty then common. "In Africa a somewhat similar process is at work." Urbanization is proceeding at astonishing speed and is likely to continue. People from villages meet a strange environment in towns—they are not known to the people they meet, their traditions no longer hold, they are introduced to a money system, they are not free but must work specified hours, marriage is no longer a family affair, crowding is common and sanitation is usually poor. In many towns the existing sanitary regulations prevent them from obtaining shelter, and they go outside, to construct the shanty towns on the outskirts, and "Malaria, the diarrhoeal diseases, tuberculosis, bilharziasis, and the helminthiases all abound. Malnutrition is common . . .". Venereal diseases are also rife, and with the disappearance of tribal traditions alcoholism and mental disorders increase.

Town planning must take all this into account, and must allow for expansion. The difficulties of installing proper sewage-disposal systems in African towns are admitted to be enormous at the present time, but a piped water supply has in some towns led to "the dramatic disappearance of such diseases as guinea-worm and bilharziasis".

The paper ends with the suggestion that persuasion and health education should be combined with such enforcement of sanitary regulations as may be necessary; people to whom the whole idea of sanitation may be strange will adapt themselves to it in time. *Charles Wilcocks*

COTTRELL, J. D. **The Prevention of Tropical Disease and the World Health Organisation's Rural Health Campaigns.** 9 pp. [1957.] London: The Institute of Rural Life at Home and Overseas, 59, Bryanston Street, W.1. [1s. 6d.]

A talk given to the Institute of Rural Life at Home and Overseas, London, by the Deputy Director, Regional Office for Europe, WHO.

REPORTS AND SURVEYS

EAST AFRICA HIGH COMMISSION. **East African Institute for Medical Research Report, 1958–1959** [HOLMES, E. G., Director]. 32 pp., 6 figs. 1959. Nairobi: Govt. Printer. [Sh. 2.]

This report is mainly concerned with nutrition work and so reflects the interests of Dr. E. G. Holmes, the Director. There is an account of attempts

to measure the effect of different states of nutrition on the chemical composition of the body by means of nitrogen balance studies and estimations of urea space. These provide fresh evidence that the water content of the cell mass is variable, as well as the volume of the extracellular field. Accurate measurements of the cutaneous losses of nitrogen in Africans are recorded and the mean value found was 0·254 ± 0·023 gm./day. Tables giving values for the concentrations of the fractions of serum proteins in pregnant and post-partum African women are given, and also some data for the rates of energy expenditure when carrying out household and agricultural tasks common in Africa.

A valuable survey of ophthalmological disorders with special reference to nutrition is reported. There is a high rate of painful and blinding eye disease in some areas which must have a serious effect on educational programmes. A proportion of this is due to poor nutrition and infections and so could be prevented.

The parasitology section has been concerned mostly with filariasis and schistosomiasis and useful laboratory and field studies are in progress.

[Reading this and previous reports of the Institute, one is impressed by the good scientific work done by a relatively small staff. Clearly there is opportunity for useful work at Mwanza and it is to be hoped that this will increasingly attract suitable recruits in the future.] *R. Passmore*

FRY, E. I. **Health Survey of Children from Rarotonga, Cook Islands. (1) Medical Examination and Evaluation.** *J. Trop. Pediatrics.* London. 1960, Mar., v. 5, No. 4, 121–9. [14 refs.]

This article, written by an anthropologist, records developmental data gathered from a study of 165 schoolchildren aged 5–16 years, on the island of Rarotonga, the largest member of the Cook group of islands which lie just within the tropical belt in the Southern Pacific. It includes also the results of a clinical medical survey carried out by the Assistant Medical Officer, Dr. Alex LARSEN, which is of limited value since laboratory assistance was not available.

The children represent a mixed population, some 60% being pure Polynesian while in 40% an admixture of European, Asian and Negro blood was evident. The general standard of health and development seems to have been good. Malnutrition was clearly evident in only 2% of the children, though conjunctival injection, attributed to a combination of vitamin A and riboflavin deficiency, was noted in 96%. Yaws was rare, only 6% showing evidence of this disease, but scabies was common, being diagnosed in 22%. Muscle tone was generally only fair.

[This article may be of interest to anthropologists: the medical data are somewhat meagre.] *J. H. Walters*

BOOK REVIEWS

DAVIDSON, Stanley [B.A., M.D., F.R.C.P.], MEIKLEJOHN, A. P. [M.A., B.Sc., D.M., M.R.C.P.] & PASSMORE, R. [M.A., D.M.] **Human Nutrition and Dietetics.** With a foreword by Lord BOYD ORR, D.S.O., M.C., LL.D., F.R.S. pp. xii + 844, illustrated. 1959. Edinburgh. London: E. & S. Livingstone, Ltd. [84s.]

The authors' preface says that this book is intended " For anyone interested in applying modern scientific knowledge to the practical problems of human nutrition, both in health and disease "; that though it is written in the language and style familiar to medicine, they hope it will be intelligible to non-medical people concerned with the subject; and that the book is divided into six parts, as follows:—

" Part I gives an account of the physiology of nutrition. It is somewhat longer and more complete than the accounts found in most standard textbooks of physiology.

" Part II gives a general description of the foods most commonly eaten by man. Their chemical and nutritive properties are described, as are the effects of food processing—milling, preserving and cooking. A short account is given of the various forms of food poisoning.

" Part III describes in detail those diseases that are known to be primarily due to faulty nutrition.

" Part IV deals with the role of defective diets in contributing to the onset of general diseases which are not primarily nutritional in origin. An account is given of the dietetic treatment of the principal diseases in which diet is of undoubted therapeutic value.

" Part V is concerned with nutrition in relation to public health. The various measures available (especially in times of crisis) for ensuring an adequate supply of food are discussed. This part includes an account of the work of the Food and Agriculture Organisation of the United Nations (FAO) and of other international bodies concerned with human nutrition. A chapter on the population problem is included.

" Part VI deals briefly with the modifications necessary in normal diets to meet the special circumstances of pregnancy, lactation, childhood, athletic training and climatic extremes. Rations for expeditions and emergencies (such as shipwreck) are also discussed."

This is a new textbook designed to bring the many aspects of human nutrition together into one volume. About half of the book covers the scientific foundation of the subject—the needs of the human body for particular nutrients, and the way in which these needs can be supplied by foods, and different preparations of food, commonly eaten in different parts of the world; the remaining half is devoted to the practical applications of this knowledge to the practice of clinical medicine and public health, and to the wider fields of administration of governments and international organizations. Part I gives a broad and comprehensive interpretation of the physiology of nutrition, and is a most informative account of modern knowledge of physiology and cellular metabolism.

The reviewer knows no other textbook of this kind of comparable scope. It should be of value not only to readers who have a direct interest in nutrition in its relation to public health, but to the doctor in clinical practice who requires authoritative information on the dietetic management of disease, whether of primary nutritional disease or of disease generally. From the information given, the reader, according to his requirements, could advise on the nutritional policy of a community, devise a satisfactory scale of diets for a hospital or institution from local foods, or obtain detailed advice on the dietetic treatment of a particular disease in relation to its general treatment, often with a reference to one of a number of menus given for special diets.

Though completely self-contained, the value of the book for the student of nutrition is enhanced by numerous references, throughout the text, to original work. It should not only find its place beside standard textbooks of medicine upon the doctor's bookshelf, but also, particularly in the many countries where nutrition presents urgent daily problems, it should be found in libraries used by scientific students, and all those concerned with the economics of human nutrition. *T. P. Eddy*

MONTALTO, Francisco Américo. **Aspectos fundamentales del problema de la nutrición en el Paraguay. Síntesis crítica y fundamentada de la labor realizada en el ex-departamento de nutrición.** [Nutrition in Paraguay] pp. xiv + 485. 1956. Buenos Aires: Impresora Oeste.

This work is a tremendous undertaking. In almost 500 closely packed pages, tables and figures, it sets out a comprehensive account of nutrition in Paraguay from a wide biological and economic angle. This breadth of view and the detailed studies reflect the author's deep enthusiasm for his subject. It is based on his experiences in the organization of the Department of Nutrition and its subsequent reorganization within the Ministry of Public Health and Social Welfare.

The greater part of the work is devoted to a comprehensive account of the fundamentals of nutrition in Paraguay. This is in 2 parts: the first is a general study of the state of nutrition of the people, the second deals with the economic aspects of it; this second part is much the larger and it underlines the emphasis, which marks the whole book, on the relationship between people, their food, the soil and their socio-economic conditions.

Part I sets out in successive chapters biometric data, physiological requirements, nutritional needs, the clinical aspects of malnutrition and the various dietary deficiencies; this last part, for the medical reader, is regrettably short, in proportion to other sections.

Part II deals with the national economy and that of the people, and the production, distribution, costs and consumption of food and a general summing-up of the situation.

The remaining quarter of the book is taken up with a review of the basic foundation of the Department of Nutrition, its organization and work and the problems studied, and ends with a discussion of the requirements for solving the very complex problems involved.

This book is not easy reading for purely medical workers, but for reference purposes and as a socio-economic study it provides an immense amount of information. *H. J. O'D. Burke-Gaffney*

JOPLING, W. H. [M.R.C.P., D.T.M. & H.], in collaboration with Philip MANSON-BAHR. **Differential Diagnosis for Practitioners in the Tropics: a Clinical Handbook.** 159 pp., illustrated. 1959. Leverkusen: Scientific Dept., Pharmaceutical Division, Farbenfabriken Bayer A.G., Germany.

This fascinating and provocative little book is written for practising doctors in the tropics. Its approach is practical; the text is devoted to what the doctor may hear, see and feel on examination of his patient, and the conclusions to

be drawn from his observations. Its scope is wide; it is concerned with disease, cosmopolitan or tropical. Starting with a consideration of the patient's appearance, manner, gait and speech, succeeding short chapters pass on to the deductions which may be drawn from simple examination of the skin, hair and nails, the eyes, ears and nasopharynx, the neck, chest and abdomen, the limbs, the breasts, groins, genitalia, perineum, and so forth, and from a study of the temperature chart. There are appendices dealing with skin lesions and rashes; with the visual examination of the urine and of the faeces; and there is a comprehensive synopsis of the requirements for and the methods of laboratory diagnosis in conditions demanding these.

"The laboratory is a good servant but a bad master" is the theme throughout; it is a maxim too often forgotten in an age of rapid technological development, with its inevitable tendency to seek a diagnosis in voluminous laboratory reports rather than by physical examination of the patient. As the authors point out in their preface, the ancillary services of medicine commonly are not available to the doctor up-country in the tropics; there he must be reliant on his own knowledge and resource, supplemented by the more simple instruments of his trade.

The fascination of this book lies in its refreshment of one's own student learning period and later reading; the provocation lies in its incitement to better the authors by discovering their omissions and errors. The reviewer was pleased to think that he had found some such; a closer study of the text or a reference to the index much reduced that number, and he was left in admiration for the width of field covered by the authors and for the manner in which they have packed it into such small compass. In comment, Egyptian splenomegaly is not named as such, but liver schistosomiasis and its manifestations are; similarly Ayerza's syndrome and cor pulmonale receive only oblique reference. There is no mention of rat-bite fevers in the index, though there is a temperature chart of such a case and they find their place in the section on laboratory diagnosis. These are but trivialities in the execution of the main purpose of the book.

Enlargement on the innumerable conditions that are mentioned can be sought by the doctor in standard works, once the diagnostic penny has dropped—it is this book's particular function to help it to do so. The photographic illustrations are first class, as are the line drawings and temperature chart depictions. The format of the book is pleasing; it is well and clearly printed on good quality paper, and it is bound durably. It most usefully fulfils its function both in content and in size—that of an overseas doctor's reference companion and a reminder that the practice of medicine primarily is an art, which is supplemented, when available, by science. *A. R. D. Adams*

DEY, N.C. [B.Sc., M.B.B.S., D. Bact.] **Medical Parasitology including Protozoology, Helminthology and Entomology.** Revised with the assistance of L. K. GANGULI, B.Sc., M.D., M.R.C.P. 2nd Edition. 163 pp., 5 coloured pls. & 61 figs. 1958. Calcutta 6: T. K. Dey, 2, Cornwallis Street. [25s.]

The general format of this book is similar to that of the first edition. The number of pages has been reduced by 3, and 3 illustrations (one a colour plate illustrating the exo-erythrocytic cycle of the malaria parasite) have been added.

The reviewer of the first edition of Dr. Dey's book [see this *Bulletin*, 1956, v. 53, 262] drew attention to certain mistakes, inaccuracies and omissions. When preparing the second edition Dr. Dey has paid due attention to this helpful criticism and not only has he corrected the errors specifically referred to, but has thoroughly revised the rest of the text, so that this edition is a great improvement on the first.

It is unfortunate that revision has not extended to the line drawings which, particularly those portraying the arthropods, are generally crude and sometimes misleading. On the other hand the photographs and plates are for the most part good and all are well chosen.

Misprints, although many have been corrected, are still present: "Peripherial" (p. 35), "Intermidiate" (p. 78) and "Siphoneptera" (p. 136) are examples.

The generalization that in the Class Insecta metamorphosis is complete requires modification.

The emphasis of Dr. Dey's book is on medical parasitology as observed in India, and so long as this is realized the present edition can be recommended as a sound introductory guide to the subject. *R. M. Gordon*

MACFARLANE, L. R. S. [O.B.E., M.D., M.A., D.P.H.] **A Short Synopsis of Human Protozoology and Helminthology.** Illustrated by R. M. LEACH, B.E.M. pp. vii + 251, 8 coloured pls. & 61 figs. 1960. London. Edinburgh: E. & S. Livingstone Ltd., 16–17, Teviot Place. [35s.]

This book is essentially a printed version of notes used to prepare students at the Royal Army Medical College for the Diploma of Tropical Medicine and Hygiene. As such, it is written in short staccato style which is not intended to stand grammatical analysis.

A short general outline is given of the usual medical protozoa and helminths, together with brief mention of other parasites which have been reported in man on rare occasions. The book should be useful for students in revising their knowledge for the examination; but it requires extensive amplification by the spoken word in many places; for example, diagnostic tests and laboratory procedures are listed by name but often there is no indication of the nature or the means of performing such tests. Consequently a practitioner endeavouring to consult the book on his own might find many things which he could not understand without consulting other publications.

Some of the statements made in the book might not receive general acceptance, for instance, is there any evidence that *Leishmania donovani* can be transmitted to man through the dog louse? Surely there are other animals which may serve as vertebrate hosts for *Trypanosoma gambiense* besides the antelope *Tragelaphus spekei*.

For each parasite notes are given on the morphology, life cycle, transmission, etc., and also on the pathology, symptoms, diagnosis and treatment. The notes on treatment are conservative rather than up to date and some of the treatments mentioned are not quite in accordance with modern practice.

There are many coloured illustrations which are excellent, especially those on malaria, and there is a good index. As is inevitable, there are a few misprints, *e.g.*, "*Onchocercus*" on p. 133.

To conclude, this book will be useful for students preparing for an examination, but people with deeper interests in parasitology or with practical problems to be solved may find that they need other publications to amplify the synopsis which is all that the present work claims to present. *F. Hawking*

BIAGI F., Francisco. **Parasitosis en pediatria.** [Parasitic Diseases in Paediatrics] pp. viii + 109, 14 figs. 1960. Mexico: Ediciones Medicas Del Hospital Infantil.

This little book is intended for medical students and doctors working in Mexico and other parts of Latin America, and relates to those aspects of parasitology which particularly concern the paediatrician. 8 protozoal and 14 helminthic diseases or groups are briefly described. The epidemiology, pathology and symptoms, diagnosis and treatment are discussed in a few paragraphs, and it is extraordinary how much information the author has managed to convey in what is quite a readable text and not merely a summary. Of course there are many omissions, but references are given at the end of each chapter through which the reader can pursue his studies; to the list of general textbooks might well be added TROWELL and JELLIFFE's *Diseases of Children in the Subtropics and Tropics* [this *Bulletin*, 1959, v. 56, 901].

The practitioner will find the treatment sections useful, in that exact regimens are given; also the book concludes with a description of some useful laboratory techniques, including culture methods for *Entamoeba histolytica*, concentration methods, precipitin and intradermal tests, Giemsa stain for blood films, xenodiagnosis, skin biopsy, etc. *P. C. C. Garnham*

ARTHUR, Don R. **Ticks. A Monograph of the Ixodoidea. Part V. On the Genera** *Dermacentor, Anocentor, Cosmiomma, Boophilus* **and** *Margaropus.* pp. xviii + 251, 510 figs. 1960. London: The Syndics of the Cambridge University Press, Bentley House, 200, Euston Road, N.W.1. [60s.]

This book, which represents the fifth part of *Ticks. A Monograph of the Ixodoidea*, is published more than 35 years after part 4 which dealt with the genus *Amblyomma* [this *Bulletin*, 1926, v. 23, 413]. This delay has had one useful outcome in that it has enabled the author to incorporate the considerable amount of work which has been done during this period.

Nearly 30 pages in the book are devoted to a consideration of the morphology and anatomy of *Dermacentor*, which forms a useful background for what is to follow. Three subsequent sections deal with the American, Eurasiatic and African species of the genus. Some doubtful species are also considered. Keys for identification of the males and females are simple and easy to use. Additional keys for the identification of nymphs of the American species and of larvae and nymphs of 3 Eurasiatic species are also included.

Under each species, references to previous literature, synonymy and descriptions of the male, female and immature stages, where known, are followed by a consideration of the related species, brief but excellent accounts of the biology and disease relationships, if any. The species described are: *imitans, paruma-*

pertus, halli, dispar, albipictus, dissimilis, occidentalis, variabilis, latus, andersoni and *hunteri* from the American region; *antrorum, auratus, taiwanensis, pavlovskyi, reticulatus, asper, albipictus kamshadalus, everestianus, sinicus, marginatus, niveus, raskemensis, silvarum, pomerantzevi, nuttalli* and *coreus* from the Eurasiatic region, and *rhinocerinus* and *circumguttatus*, with its variety *cunhasilvai*, from the African region.

The genus *Anocentor* is represented by a single species, *nitens*, and the genus *Cosmiomma* by the species *hippopotamensis* which was formerly placed under *Dermacentor*.

The 3 species of *Boophilus, microplus, annulatus* and *decoloratus* are dealt with under the same headings as the species of *Dermacentor*. Although descriptions of the larvae and nymphs of the 3 species are given, these have not been brought together in a key.

The genus *Margaropus* is represented by the species *winthemi* and *reidi*.

Since the genera *Anocentor* and *Cosmiomma* have been included in the book, it is difficult to understand the omission of the monotypic genus *Nosomma*, which is considered by SHARIF (*Rec. Indian Mus.*, 1928, v. 30, 297) to show close affinities with *Dermacentor*.

A more detailed account of the geographical distribution and hosts of the various species, similar to that given in the earlier parts of the monograph, would have been welcome.

The book is profusely illustrated with good text figures and 4 photographic plates. The bibliography lists over 250 references. The printing and lay-out are good. The preparation of a taxonomic monograph is a laborious and difficult task. Both Dr. Arthur and the publishers deserve our congratulations on the production of this work, which will be welcomed by all acarologists who have been wondering for years when the next part of the Monograph on Ticks was going to appear. *M. G. R. Varma*

MOZLEY, Alan. [D.Sc., Ph.D., F.R.S.E.] **Consequences of Disturbance. The Pest Situation Examined.** pp. x + 61. 1960. London: H. K. Lewis & Co. Ltd., P.O. Box 66, 136 Gower Street, W.C.1. [9s.]

When a set of biological circumstances remains unchanged for a long period there is a tendency for the appearance of many species of plant and animals, which become established in a biological balance in which none predominates and each is restrained to some optimum density. Disturbance of the equilibrium produces a well-known train of events; opportunist species multiply and may become predominant, often, however, temporarily, so that they succeed one another like crops of weeds until at length a normal balance of species is restored. Disturbance is characterized, apart from this opportunism, by fluctuations in the balance and by invasion of neighbouring undisturbed territories by the temporarily predominant species. Snails participate in this chain of events. The known trematode carriers are usually very sparse in undisturbed natural conditions but may take advantage of disturbance to proliferate. They tend, therefore, to multiply in the wake of human activity as have *Lymnaea truncatula* in Britain and various species of *Bulinus* and *Biomphalaria* elsewhere. Ecological and epidemiological study and schemes of control have taken inadequate account of this relationship and of the possible

frustration of over-enthusiastic control by the disturbance which it itself creates. Chemical control or other destructive practices may be self-limiting for this type of reason. The understanding of possible mechanisms requires the study of such processes as the modification of the vegetation whether cultivated or wild, impoverishment of the medium of growth, replacement by other species, management of border areas, concentration of the pest in limited zones from which it could be abruptly eradicated, the strengthening of natural barriers to spread, and biological techniques such as have been used in the control of the screw-worm.

The author proceeds to a discussion of the philosophy of science, the place of measurement and analysis in the defining of happenings in the building up of a theory, and the need for the support of basic sciences and basic scientists.

[This essay helpfully suggests the lines along which the imagination might work when considering any biological problem. Its author would not claim to announce any solution and the reader is unlikely to find one or may well be confused by apparent contradictions or inadequacies when he thinks he has.]

G. Macdonald

NOTICE

Consideration has from time to time been given to the question whether it would be desirable to include authors' addresses in the headings of abstracts in the *Bulletins* and it has been decided that the additional time and cost involved would not be justified. Subscribers are advised, however, that the Bureau will, on request, notify them of the name and address of the author of the article, or the publisher of the journal, from which an abstract has been made.

The Bureau also deals with enquiries from individual subscribers relating to abstracts which have appeared in the *Tropical Diseases Bulletin* and the *Bulletin of Hygiene*; correct references and the exact nature of the information required should be stated.

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